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TEST REPORT

of

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

FCC ID: BEJIGCJ2PHN

Equipment Under Test	:	Car AVN
Model Name	:	IGCJ2PHN
Variant Model Name(s)	:	-
Applicant	:	LG Electronics USA
Manufacturer	:	LG Electronics Inc.
Date of Receipt	:	2022.12.07
Date of Test(s)	:	2022.12.23 ~ 2023.02.16
Date of Issue	:	2023.03.06

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

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Tested by: Teo Kim

Technical Manager: Inho Park

SGS Korea Co., Ltd. Gunpo Laboratory

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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
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- Designation number: KR0150

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1.2. Details of Applicant

Applicant : LG Electronics USA
Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, United States, 07632
Contact Person : Cho, Hee-jae
Phone No. : +1 201 470 2696

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		IGCJ2PHN
Serial Number		211VIAXC96880
Power Supply		DC 12 V
Rated Power		GSM 850: 32 ㏈m GSM 1 900: 28.5 ㏈m WCDMA Ⅱ, Ⅳ, Ⅴ: 23 ㏈m LTE Band 2, 4, 5, 7, 12, 26: 23 ㏈m
Frequency Range		GSM 850: 824 ㎒ ~ 849 ㎒ GSM 1 900: 1 850 ㎒ ~ 1 910 ㎒ WCDMA Ⅱ: 1 850 ㎒ ~ 1 910 ㎒ WCDMA Ⅳ: 1 710 ㎒ ~ 1 755 ㎒ WCDMA Ⅴ: 824 ㎒ ~ 849 ㎒ LTE Band 2: 1 850 ㎒ ~ 1 910 ㎒ LTE Band 4: 1 710 ㎒ ~ 1 755 ㎒ LTE Band 5: 824 ㎒ ~ 849 ㎒ LTE Band 7: 2 500 ㎒ ~ 2 570 ㎒ LTE Band 12: 699 ㎒ ~ 716 ㎒ LTE Band 26(Part 90): 814 ㎒ ~ 824 ㎒ LTE Band 26(Part 22): 824 ㎒ ~ 849 ㎒ 2 402 ㎒ ~ 2 480 ㎒ (Bluetooth) 2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20) 5 180 ㎒ ~ 5 240 ㎒ (Band 1: 11a/n_HT20, 11ac_VHT20) 5 190 ㎒ ~ 5 230 ㎒ (Band 1: 11n_HT40, 11ac_VHT40) 5 210 ㎒ (Band 1: 11ac_VHT80) 5 745 ㎒ ~ 5 825 ㎒ (Band 3: 11a/n_HT20, 11ac_VHT20) 5 755 ㎒ ~ 5 795 ㎒ (Band 3: 11n_HT40, 11ac_VHT40) 5 775 ㎒ (Band 3: 11ac_VHT80)
Modulation Technique		QPSK, 16QAM, GMSK, 8PSK, DSSS, OFDM, GFSK, π/4DQPSK, 8DPSK
Number of Channels		79 channels (Bluetooth) 11 channels (11b/g/n_HT20) 4 channels (Band 1: 11a/n_HT20, 11ac_VHT20) 2 channels (Band 1: 11n_HT40, 11ac_VHT40) 1 channel (Band 1: 11ac_VHT80) 5 channels (Band 3: 11a/n_HT20, 11ac_VHT20) 2 channels (Band 3: 11n_HT40, 11ac_VHT40) 1 channel (Band 3: 11ac_VHT80)
Antenna Type		External Antenna
Antenna Gain※	**Port 1**	2 400 ㎒ ~ 2 483.5 ㎒: 3.00 ㏈i (Bluetooth) 5 150 ㎒ ~ 5 250 ㎒: 5.00 ㏈i (WLAN 5 G) 5 725 ㎒ ~ 5 850 ㎒: 5.00 ㏈i (WLAN 5 G)
	Port 2	2 400 ㎒ ~ 2 483.5 ㎒: 3.00 ㏈i (WLAN 2.4 G) 5 150 ㎒ ~ 5 250 ㎒: 5.00 ㏈i (WLAN 5 G) 5 725 ㎒ ~ 5 850 ㎒: 5.00 ㏈i (WLAN 5 G)
	Port 3	699 ㎒ ~ 716 ㎒: -1.38 ㏈i 814 ㎒ ~ 824 ㎒: -1.79 ㏈i 824 ㎒ ~ 849 ㎒: -0.69 ㏈i 1 710 ㎒ ~ 1 755 ㎒: 0.76 ㏈i 1 850 ㎒ ~ 1 910 ㎒: 0.85 ㏈i 2 500 ㎒ ~ 2 570 ㎒: 0.99 ㏈i
H/W Version		V9.0
S/W Version		IP36
FVIN		N/A

1.5. Declaration by the Manufacturer

- Bluetooth transmits only on Port 1.
- WLAN 2.4G transmits only on Port 2.
- WLAN 5G transmits on both Port 1 and Port 2.
- WWAN transmits on Port 3.

1.6. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL003836	2023.02.20	Initial
1	F690501-RF-RTL003836-1	2023.03.06	Revised an antenna gain

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 (㎒)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (㎽/㎠)	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
300-1 500	-	-	**f/1500**	**30**
1 500-100 000	-	-	**1.0**	**30**

2.1.1. Friis transmission formula: Pd = (Pout*G)/(4*pi*R^2)

Where Pd = power density in ㎽/㎠

Pout = output power to antenna in ㎽

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd the limit of MPE, 1 ㎽/㎠. 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.

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 (㎒)	Cable Loss (㏈)	Antenna Gain of EUT (㏈i)	Final Antenna Gain (㏈i)
Bluetooth	2 400 ~ 2 483.5	-1.94	3.00	1.06
WLAN 2.4G	2 400 ~ 2 483.5	-1.94	3.00	1.06
WLAN 5G (Ant. 1)	5 150 ~ 5 250	-2.08	5.00	2.92
WLAN 5G (Ant. 1)	5 725 ~ 5 850	-2.08	5.00	2.92
WLAN 5G (Ant. 2)	5 150 ~ 5 250	-2.08	5.00	2.92
WLAN 5G (Ant. 2)	5 725 ~ 5 850	-2.08	5.00	2.92
WLAN 5G (Ant. 1+ Ant. 2)	5 150 ~ 5 250	-2.08	8.01	5.93
WLAN 5G (Ant. 1+ Ant. 2)	5 725 ~ 5 850	-2.08	8.01	5.93
GSM 850	824 ~ 849	-1.12	-0.69	-1.81
GSM 1900	1 850 ~ 1 910	-1.12	0.85	-0.27
WCDMA 2	1 850 ~ 1 910	-1.12	0.85	-0.27
WCDMA 4	1 710 ~ 1 755	-1.12	0.76	-0.36
WCDMA 5	824 ~ 849	-1.12	-0.69	-1.81
LTE 2	1 850 ~ 1 910	-1.12	0.85	-0.27
LTE 4	1 710 ~ 1 755	-1.12	0.76	-0.36
LTE 5	824 ~ 849	-1.12	-0.69	-1.81
LTE 7	2 500 ~ 2 570	-1.94	0.99	-0.95
LTE 12	699 ~ 716	-0.76	-1.38	-2.14
LTE 26	814 ~ 849	-1.12	-0.69	-1.81

Note;

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

2.1.4. Output Power into Antenna & RF Exposure Evaluation Distance

Bluetooth_ Ant.1

- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 400 ~ 2 483.5	2	1.06	0.000 402	1

WLAN (2.4G)_ Ant.2

- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 400 ~ 2 483.5	15	1.06	0.008 030	1

WLAN (5G)_ Ant.1

- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
5 150 ~ 5 250	2.5	2.92	0.000 693	1
5 725 ~ 5 850	2.5	2.92	0.000 693	1

WLAN (5G)_ Ant.2

- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
5 150 ~ 5 250	3.5	2.92	0.000 872	1
5 725 ~ 5 850	3.5	2.92	0.000 872	1

WLAN (5G)_ Ant.1+Ant.2

- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
5 150 ~ 5 250	6	5.93	0.003 103	1
5 725 ~ 5 850	6	5.93	0.003 103	1

GSM 850
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Duty Cycle (%)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
824 ~ 849	34	25	-1.81	0.082 351	0.549

GSM 1 900
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Duty Cycle (%)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1 850 ~ 1 910	30.5	25	-0.27	0.052 441	0.549

WCDMA Band 2
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1 850 ~ 1 910	25	-0.27	0.059 119	1

WCDMA Band 4
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1 710 ~ 1 755	25	-0.36	0.057 907	1

WCDMA Band 5
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
824 ~ 849	25	-1.81	0.041 470	0.549

LTE Band 2
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1 850 ~ 1 910	25	-0.27	0.059 119	1

LTE Band 4
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1 710 ~ 1 755	25	-0.36	0.057 907	1

LTE Band 7
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 500 ~ 2 570	25	-0.95	0.050 551	1

LTE Band 12
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
699 ~ 716	25	-2.14	0.038 435	0.466

LTE Band 26/5_Part 22
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
824 ~ 849	25	-1.81	0.041 470	0.549

LTE Band 26_Part 90
- Maximum tune up tolerance

Frequency Range (㎒)	Maximum Tune up Average Output Power (dB m)	Final Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
814 ~ 824	25	-1.81	0.041 470	0.542

Note;

- The power density Pd (5th column) at a distance of 20 ㎝ calculated from the friis transmission formula is far below the limit of 1 ㎽/㎠.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 ㎝ between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dBi and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.
- According to KDB 447498 D01 RF Exposure Guidance 4.1.
- The RF exposure was evaluated by output average power of tune-up procedure considering tolerance. So, Maximum peak conducted power may exceed the power mentioned in this report.

Simultaneous transmission of RF Exposure test exclusion for worst case configuration.

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

Bluetooth_Ant.1 + WLAN2_Ant.2 + WWAN_Ant.3 : (0.000 402 / 1) + (0.008 030 / 1) + (0.082 351 / 0.549)
= 0.158 434 ≤ 1.0

WLAN5_(Ant.1+Ant.2) + WWAN_Ant.3 : (0.003 103 / 1) + (0.082 351 / 0.549)
= 0.153 105 ≤ 1.0

- End of the Test Report -