

# 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

<b>Kind of Product</b>	Car AVN
<b>Model Name</b>	IGCJ1PHN
<b>Power Supply</b>	DC 12 V
<b>Frequency Range</b>	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 <sup>2</sup> )	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 <sup>2</sup>	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 <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
<b><u>300-1 500</u></b>	-	-	<b><u>f/1500</u></b>	<b><u>30</u></b>
<b><u>1 500-100 000</u></b>	-	-	<b><u>1.0</u></b>	<b><u>30</u></b>

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

Where  $P_d$  = power density in  $mW/cm^2$

$P_{out}$  = output power to antenna in  $mW$

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

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

$P_d$  the limit of MPE,  $1 mW/cm^2$ . 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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
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/cm<sup>2</sup>.
- 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 dBi and must not be collocated 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  $\leq 1.0$ ;  
 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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