



# PCTEST ENGINEERING LABORATORY, INC.

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## RF EXPOSURE EVALUATION Maximum Permissible Exposure (MPE)

**Applicant Name:**

LG Electronics Inc.  
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Jinwi-myeon, Pyeongtaek-si  
Gyeonggi-do, 17709, Korea

**Date of Testing:**

7/1/2016

**Test Site/Location:**

PCTEST Lab, Columbia, MD, USA

**Test Report Serial No.:**

0Y1606211104.BEJ

**FCC ID:** BEJWC900A15

**APPLICANT:** LG Electronics Inc.

**EUT Type:** Vehicle Installed Wireless Charging System

**FCC Rule Part(s):** FCC Part 1 (§1.1310) and Part 2 (§2.1091)

**FCC Classifications:** Part 15 Low Power Transmitter Below 1705 kHz (DCD)



**Test Procedure:** KDB 680106 D01 v02

The device bearing the FCC Identifier specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in KDB 680106 D01 v02. These measurements were performed with no deviation from the standards. Test results reported herein relate only to the item(s) tested.

I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

  
Randy Ortanez  
President





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## 1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 1.1 Introduction

This document is prepared on behalf of LG Electronics Inc. to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations in the mobile two operating condition of the EUT. MPE testing was performed to demonstrate compliance with the MPE limits for the mobile use condition.



The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
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
300-1500	...	...	f/300	6
1500-100,000	...	...	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
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
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

Table 1-1. Limits for Maximum Permissible Exposure (MPE)

### 1.2 EUT Description

The EUT consists of the LGE Vehicle Installed Wireless Charger System used with two dummy loads that are representative of the PMA and WPC wireless charging protocols. Wireless power transfer is initiated when one of the loads is placed on the charger system. Output power of the charging pad is 15W in WPC mode and 5W in PMA mode.

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### 1.3 MPE Requirements Overview



Three different categories of transmitters are defined by the FCC in KDB 680106 D01 v02. These categories are fixed installation, mobile, and portable and are defined as follows:

- **Fixed Installations:** fixed location means that the device, including its antenna, is physically secured at a permanent location and is not able to be easily moved to another location. Additionally, distance to humans from the antenna is maintained to at least 2 meters.
- **Mobile Devices:** a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located, such as a wireless modem operating in a laptop computer, are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR §2.1091.
- **Portable Devices:** a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. Portable device requirements are found in Section 2.1093 of the FCC's Rules (47 CFR §2.1093).

The FCC also categorizes the use of the device as based upon the user's awareness and ability to exercise control over his or her exposure. The two categories defined are Occupational/ Controlled Exposure and General Population/Uncontrolled Exposure. These two categories are defined as follows:

- **Occupational/Controlled Exposure:** In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program. If appropriate, warning signs and labels can also be used to establish such awareness by providing prominent information on the risk of potential exposure and instructions on methods to minimize such exposure risks.
- **General Population/Uncontrolled Exposure:** The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

The **LGE Vehicle Installed Wireless Charging System FCC ID: BEJWC900A15** is evaluated to the "General Population/Uncontrolled Exposure" limits for Mobile exposure condition as described in Section 1.1 above.

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## 1.4 Test Equipment

Test equipment calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Narda	EHP-200A	EM Field Probe	3/24/2016	Annual	3/24/2017	170WX50922

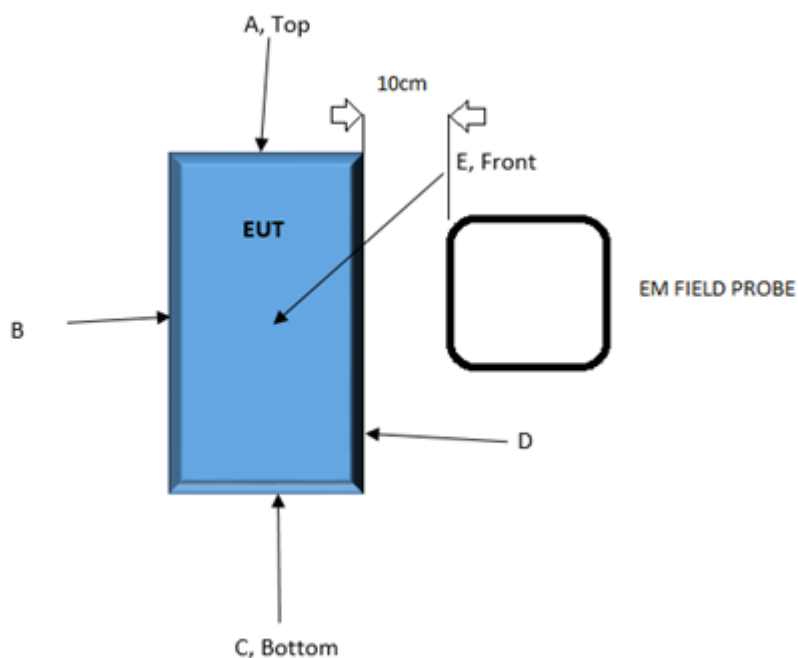
**Table 1-2. Test Equipment List**

## 1.5 Test Setup



Maximum E-field and H-field measurements were made on each of five sides of the EUT that could come in contact with a user. The five sides are defined as follows: Top (A), Left (B), Bottom (C), Right (D), and Front (E). Refer to the test position diagram below.

### Mobile Condition

Probe	Condition	Test Distance (cm)
E-field	Mobile	Variable
H-field	Mobile	Variable



**Figure 1. Test Positions and Probe Distance**

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## 1.6 Mobile Condition MPE

The procedure used to determine the RF power density for the mobile condition was based upon E-field and H-field measurements recorded using a calibrated probe. All measurements were recorded with the EUT (the charging system) transferring power to the Rx dummy loads that support the PMA and WPC charging protocols. The pad itself was running off of a 12VDC power supply.

The field strength of the E field and H-field was measured at an EUT-to-probe-measurement-axis distance as shown in Section 1.5 using the equipment listed in Section 1.4.

Care was exercised to ensure that the charging system was transferring power to the dummy loads throughout the duration of the field strength measurements. The field strength data in the tables below are shown for each of the dummy loads (PMA and WPC).

During testing, the charging system with the PMA and WPC dummy loads was placed on a non-conductive (composite plastic) table top. The probe was positioned at the location where there is maximum field strength on each side of the EUT. The maximum E-field and H-field is reported below for each configuration.

Distance (cm)	EUT SIDES					Limit (V/m)
	A (V/m)	B (V/m)	C (V/m)	D (V/m)	E (V/m)	
10	1.826	1.825	1.948	2.158	3.777	614.00
8	2.470	2.867	3.112	3.348	4.460	614.00
6	3.826	4.331	4.947	4.682	8.099	614.00
4	7.091	7.531	8.503	8.263	13.346	614.00
2	16.991	16.029	18.880	17.698	28.135	614.00
0	23.001	28.355	25.730	33.046	54.601	614.00

**Table 1-3. E-field Measurements for Decremental Test Distances (WPC)**

Distance (cm)	EUT SIDES					Limit (V/m)
	A (V/m)	B (V/m)	C (V/m)	D (V/m)	E (V/m)	
10	0.665	0.786	0.719	0.708	0.935	614.00
8	0.752	1.511	0.881	0.793	1.085	614.00
6	1.017	2.228	1.201	1.186	1.565	614.00
4	1.800	3.589	1.687	2.238	2.947	614.00
2	3.048	6.208	3.174	4.812	5.083	614.00
0	4.562	6.446	4.122	7.117	11.280	614.00

**Table 1-4. E-field Measurements for Decremental Test Distances (PMA)**

Distance (cm)	EUT SIDES					Limit (A/m)
	A (A/m)	B (A/m)	C (A/m)	D (A/m)	E (A/m)	
10	0.116	0.173	0.064	0.089	0.194	1.63
8	0.174	0.232	0.098	0.102	0.350	1.63
6	0.257	0.393	0.103	0.124	0.501	1.63
4	0.324	0.588	0.331	0.363	0.787	1.63
2	0.863	1.201	1.129	0.640	2.359	1.63
0	1.846	1.432	2.411	1.023	3.998	1.63



**Table 1-5. H-field Measurements for Decremental Test Distances (WPC)**

Distance (cm)	EUT SIDES					Limit (A/m)
	A (A/m)	B (A/m)	C (A/m)	D (A/m)	E (A/m)	
10	0.085	0.114	0.208	0.137	0.214	1.63
8	0.125	0.271	0.334	0.202	0.319	1.63
6	0.213	0.411	0.489	0.316	0.481	1.63
4	0.322	0.725	0.607	0.744	0.928	1.63
2	1.389	1.045	0.978	1.247	1.865	1.63
0	3.001	1.441	1.997	1.671	2.791	1.63

**Table 1-6. H-field Measurements for Decremental Test Distances (PMA)**

## 2.0 CONCLUSION

The E-field and H-field data shown in this report show that the Vehicle Installed Wireless Charger System is compliant with the MPE limits for both the PMA and WPC charging dummy loads at a distance of 4cm.

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