Underwriters Laboratories Inc.

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Order No.: 10950014
Report No.: 14-10950014-FCC-2
Date: October 14, 2015
Model No.: AN-SP700

FCC/IC RF Exposure Report

in accordance with
FCC Part 2 Subpart J §2.1093
RSS-102 Issue 5

for

Slim Remote

LG Electronics Inc.
222, LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea

Summary of Test Results:

The following tests were performed on a sample submitted for evaluation of compliance with FCC Part 2 Subpart J Section 2.1093 and RSS-102 Issue 5

No	FCC Reference Clause No.	IC Reference Clause No.	Conformance Requirements	Result Verdict	Remark
1	2.1093	RSS-102 Section 4	RF Exposure of Humans to RF Fields	Complied	

Conclusion:

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by UL Korea Ltd. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

Witness tested by
Jihoon Lee, WiSE Laboratory Engineer
Consumer Technology Division
UL Korea Ltd.
October. 14, 2015

Reviewed by
ChangMin, Kim, WiSE Engineer
Consumer Technology Division
UL Korea Ltd.
October. 14, 2015

Test Report Details

Tests Performed By:	UL Korea Ltd. 26th FL. GFC Center, 737 Yeoksam-dong, Gangnam-gu, Seoul, 135-984, Korea
Test Site:	KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-390, Korea
Applicant:	LG Electronics Inc. 222, LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea
Applicant Contact:	Byeong Kyu Jang
Title:	Research Engineer
Phone:	82-31-617-0429
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Product Type:	Slim Remote
Model Number:	AN-SP700
Trademark	
Sample Serial Number:	N/A
Test standards:	FCC Part 2 Subpart J §2.1093 RSS-102 Issue 5
Sample Serial Number:	N/A
Sample Receive Date:	September 16, 2015
Testing Start Date:	September 17, 2015
Testing Complete Date:	October 05, 2015
Overall Results:	**Pass**

UL Korea Ltd. reports apply only to the specific test samples and test results submitted for UL's review. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL Korea Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL Korea Ltd. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or any agency of the National Authorities. This report may contain test results that are not covered by the NVLAP or KOLAS accreditation.

Report Directory

1. General Product Information

1.1. Equipment Description:

AN-SP700 is a Slim Remote with Bluetooth LE.

1.2. Details of Test Equipment (EUT)

- Equipment Type : Slim Remote
- Model No. : AN-SP700
- Type of test Equipment : Portable type
- Operating characteristic : Short range wireless device operating in the 2400 – 2483.5 ISM frequency band
- Manufacturer : LG Electronics Inc.
  222, LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea

1.3. Equipment Configuration

The EUT is consisted of the following component provided by the manufacturer.

Use*	Product Type	Manufacturer	Model	Comments
EUT	Slim Remote	LG Electronics Inc.	AN-SP700	-
Note: Use = EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment. SIM - Simulator (Not Subjected to Test)				

1.4. Technical Data:

Item	Description
Frequency Ranges	2 402 – 2 480 MHz
Output power	Max. -3 dBm[2)]
Kind of modulation (s)	GFSK
Channel	40 channels (Bluetooth LE)
Antenna Gain	Max. 2.97 dBi
Working temperature	0 ~ 60 ℃
Supply Voltage	DC 3.0 V

Note ;

1. All the technical data described above were provided by the manufacturer.
2. Transmit power tolerance is declared by the manufacturer. (Transmit power tolerance = +/- 1dBm)

1.5. Antenna Information:

Antenna Model Name : SP16
Antenna Type : PCB Pattern antenna
Manufacturer : RADINA. Co.,Ltd
Transmit Gain dBi : Max. 2.97 dBi
Azimuth Beam Pattern : Omni-directional
Polarization : Linear

1.6. Equipment Type:

☐ Radio and ancillary equipment for fixed or semi-fixed use
☐ Radio and ancillary equipment for vehicular mounted use
☒ Radio and ancillary equipment for portable or handheld use

☒ Stand alone ☐ Host connected

☒ Self contained single unit ☐ Module with associated connection or interface

1.7. Technical description and documents:

No.	Document Title and Description
1	User Manual
Note: The following documents were provided by the manufacturer.	

1.8. Equipment Marking Plate

1.9. Description of additional model name

Model	Description	Comment
AN-SP700	Basic Model	-

1.10. Maximum Output Power (Baseline Measurement)

Modulation Type	Data Rate	Channel Frequency (MHz)	Peak Power (dBm)
GFSK	1 Mbps	2 402	-2.37
		2 440	-2.77
		2 480	-3.37

Note :
1. Max. Power condition declared by the manufacturer

2. Test Specification

The following test specifications and standards have been applied and used for testing.

KDB 447498 D01 v05r02 : Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies

3. Test Conditions

3.1. Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Slim Remote	LG Electronics Inc.	AN-SP700	-
AE	Desktop PC	A-tech	APTNBDH	-
***Note:** Use = EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment. SIM - Simulator (Not Subjected to Test)				

3.2. Input/Output Ports

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
1	Power Input	DC	N	N	Connected to DC Power supply
2	Radio Antenna	I/O	N	Y	-
3	Serial port	I/O	N	Y	Connected to Desktop PC

***Note:**
AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

3.3. Power Interface

Mode #	**Voltage (V)**	**Current (A)**	**Power (W)**	**Frequency (DC/AC-Hz)**	**Phases (#)**	**Comments**
1	3.0V	-	-	DC	-	Rating of EUT

3.4. Operating Frequencies

Mode #	Frequency tested
1	Operating frequency range : 2 402 ㎒ ~ 2 480 ㎒ (Bluetooth LE) - Low : 2 402 MHz - Mid : 2 440 MHz - High : 2 480 MHz

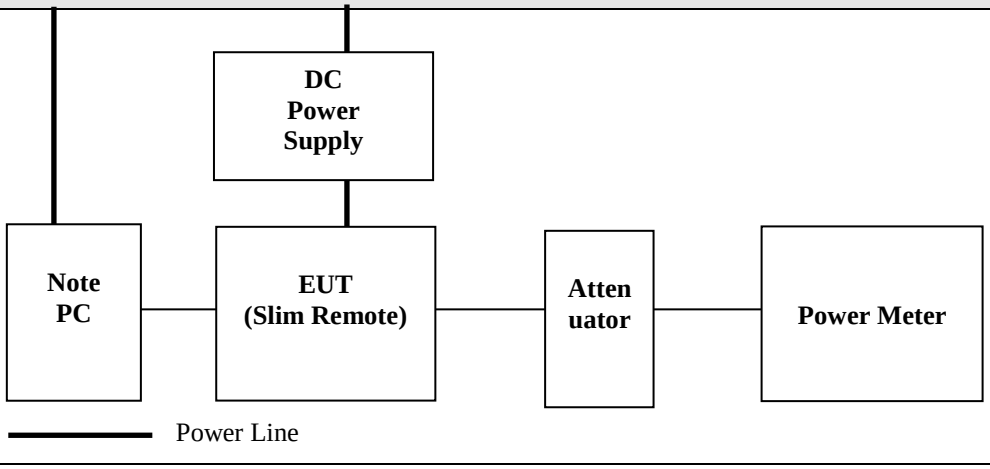
3.5. Operation Modes

Mode #	Description
1	Carrier on mode: Signal from the RF module was generated continuously for the representative channels (Low, Mid, High) by the test program incorporated
Note : - The worst-case condition is determined by the baseline measurement of RF output power out of various modulations and data rates.	

3.6. Environment Conditions

Parameters	Normal condition
Temperature	+15℃ to +35℃;
Humidity	20 % to 75 %
Supply voltage	DC 3.0 V (Rated nominal voltage)
Note ;. - The operating condition for humidity requirement has not been declared in the manufacturer's specification. - Test has been carried out for three frequencies specified above under the normal condition.	

3.7. Test Configurations

Mode #	Description
1	

3.8. List of Test Equipment

No	Description	Manufacturer	Model	Identifier	Cal. Due
1	WIDEBAND POWER SENSOR	R & S	NRP-Z81	102398	15.11.27
2	Coaxial Fixed Attenuator	AGILENT	8491A	MY52460424	16.07.13

4. Test Results of RF Exposure Evaluation

TEST: RF Exposure Evaluation		
Method	RF Exposure Evaluation of the EUT were measured according to the dictates in KDB 447498 **General SAR test exclusion guidance** The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by: [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]*[$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where • f (GHz) is the RF channel transmit frequency in GHz • Power and distance are rounded to the nearest mW and mm before calculation • The result is rounded to one decimal place for comparison • 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.	
Reference Clause	Part2 J Section 2.1093	
Parameters recorded during the test	Laboratory Ambient Temperature	25.4 °C
	Relative Humidity	47 %
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	2 402 MHz - 2 480 MHz	Antenna port

Configuration Settings

Power Interface Mode # (See Section 3.3)	EUT Operation Mode # (See Section 3.5)	Test Configurations Mode # (See Section 3.7)
1	1	1
Supplementary information: None		

SAR Test Exclusion Threshold

KDB 447498 D01 Appendix A – SAR Test Exclusion Thresholds for 100MHz – 6GHz and ≤ 50mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table. The equation and threshold in section 4.3.1 must be applied to determine SAR test exclusion.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1 500	12	24	37	49	61	
1 900	11	22	33	44	54	
2 450	10	19	29	38	48	
3 600	8	16	24	32	40	
5 200	7	13	20	26	33	
5 400	6	13	19	26	32	
5 800	6	12	19	25	31	

MHz	30	35	40	45	50	mm
150	232	271	310	349	387	SAR Test Exclusion Threshold (mW)
300	164	192	219	246	274	
450	134	157	179	201	224	
835	98	115	131	148	164	
900	95	111	126	142	158	
1 500	73	86	98	110	122	
1 900	65	76	87	98	109	
2 450	57	67	77	86	96	
3 600	47	55	63	71	79	
5 200	39	46	53	59	66	
5 400	39	45	52	58	65	
5 800	37	44	50	56	62	

Note: 10-g Extremity SAR Test Exclusion Power Thresholds are 2.5 times higher than the 1-g SAR Test Exclusion Thresholds indicated above. These thresholds do not apply, by extrapolation or other means, to occupational exposure limits.

RSS-102 Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤ 5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤ 300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1 900	7 mW	10 mW	18 mW	34 mW	60 mW
2 450	4 mW	7 mW	15 mW	30 mW	52 mW
3 500	2 mW	6 mW	16 mW	32 mW	55 mW
5 800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥ 50 mm
≤ 300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1 900	99 mW	153 mW	225 mW	316 mW	431 mW
2 450	83 mW	123 mW	173 mW	235 mW	309 mW
3 500	86 mW	124 mW	170 mW	225 mW	290 mW
5 800	56 mW	71 mW	85 mW	97 mW	106 mW

Note 1: The exemption limits in Table 1 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.
Note 2: Transmitters operating between 0.003-10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in Section 4.

4.1. Output Power into Antenna & RF Exposure Evaluation

4.1.1. SAR test exclusion

Modulation Type	Frequency (MHz)	Target Power W/tolerance (dBm)	Max tune up Power (dBm)	Max tune up Power (mW)	Separation Distance (mm)	FCC Limit[2)] (mW)	IC Limit[3)] (mW)
GFSK	2 450	-3 ± 1.0	-2.0	0.63	5	10	4

Note :

1. EUT operated in 2.45 GHz frequency band.
2. KDB 447498 D01 Appendix A – SAR Test Exclusion Thresholds for 100MHz – 6GHz and ≤ 50mm
3. RSS-102 Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance