

FCC EVALUATION REPORT FOR CERTIFICATION

FCC Subpart C (Class II Permissive Change)

Applicant: LG Electronics Inc.**222, LG-ro, Jinwi-myeon, Pyeongtaek-si,****Gyeonggi-do, 451-713, Korea****Attn: Mr. Yong-duk Kwon / Senior Engineer****Date of Issue: December 07, 2016****Order Number: GETEC-C1-16-454****Test Report Number: GETEC-E3-16-058****Test Site: GUMI UNIVERSITY EMC CENTER****FCC Registration Number: (269701)****FCC ID. : BEJ-LGE-MEDIA-SB1****Applicant : LG Electronics Inc.**

Rule Part(s)	: FCC Part 15 Subpart C-Intentional Radiator § 15.247
Test Method	: ANSI C63.10 (2013)
Equipment Class	: Digital Transmission System(DTS)
EUT Type	: RF Remote controller
Type of Authority	: Certification
Model Name	: LGE-MEDIA-SB1
Trade Mark	: LG Electronics

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10 (2013)

I 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 vest 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.

Tested by,**Reviewed by,**

Soon-Hoon Jeong, Senior Engineer
GUMI UNIVERSITY EMC CENTER



Jae-Hoon Jeong, Technical Manager
GUMI UNIVERSITY EMC CENTER

GETEC-QP-28-007 (Rev.02)

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Scope: Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.

1. General Information

Applicant: LG Electronics Inc.

Applicant Address: 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea.

Manufacturer : LG Electronics Inc.

Contact Person: Mr. Yong-duk Kwon / Senior Engineer

Telephone Number: +81-31-3610-9606

- **FCC ID.** BEJ-LGE-MEDIA-SB1
- **Equipment Class** Digital Transmission System (DTS)
- **EUT Type** RF Remote controller
- **Model Name** LGE-MEDIA-SB1
- **Rule Part(s)** FCC Part 15 Subpart C-Intentional Radiator § 15.247
- **Test Method** ANSI C63.10 (2013)
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.10 (2013), KDB558074 D01 DTS Meas Guidance v03r05(April 8,2016)
- **Dates of Test** December 06, 2016
- **Place of Test** **GUMI UNIVERSITY EMC CENTER** (FCC Test firm Registration No.: 269701)
37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 730-711, Republic of Korea
- **Test Report Number** GETEC-E3-16-058
- **Dates of Issue** December 07, 2016

EUT Type: RF Remote controller

FCC ID.: BEJ-LGE-MEDIA-SB1





2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2009) was used in determining radiated and conducted emissions emanating from **LG Electronics Inc. RF Remote Controller (Model name: LGE-MEDIA-SB1)**

These measurement tests were conducted at **GUMI UNIVERSITY EMC CENTER**.

The site address is 37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 730-711, Gyeongnam 641-713, Korea

This test site is one of the highest point of Gumi 1 college at about 200 kilometers away from Seoul city and 40 kilometers away from Daejeon city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.10 (2013)

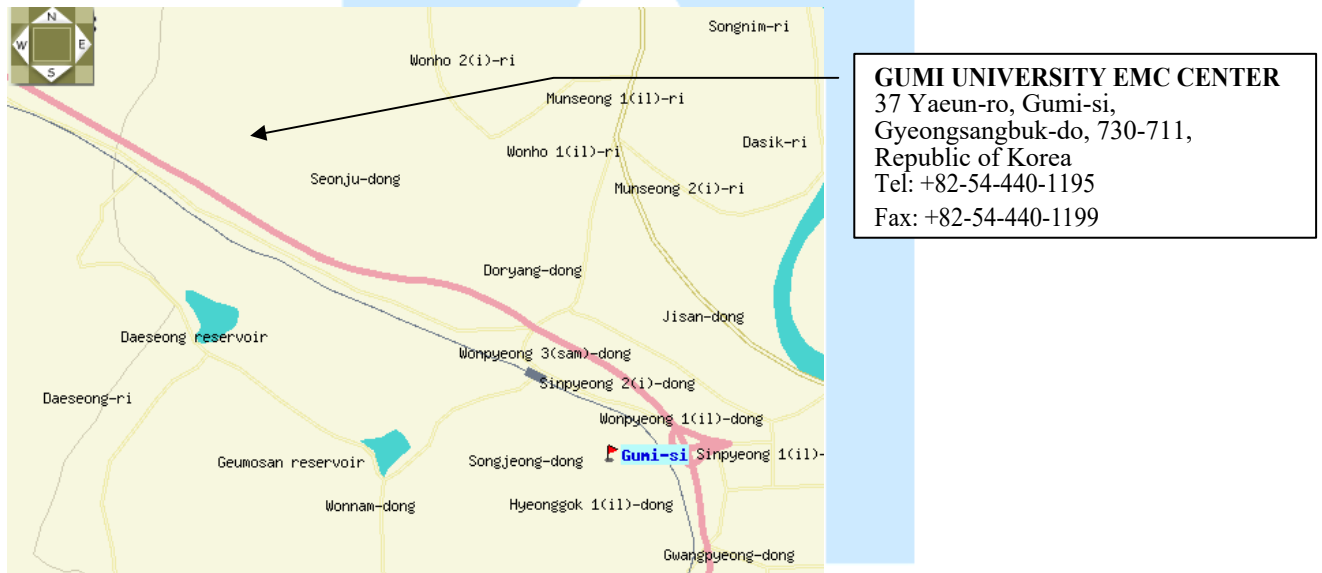


Fig 1. The map above shows the Gumi University in vicinity area.



3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc. Remote controller**
(Model Name: LGE-MEDIA-SB1) FCC ID.: BEJ-LGE-MEDIA-SB1

- Equipment	: RF Remote Controller
- Model name	: LGE-MEDIA-SB1
- Brand name	: LG Electronics
- Serial number	: Proto type
- Electrical Rating	: DC 3.0 V('AAA' Battery x2)
- Channel Separations	: 2 MHz
- Type of Modulation	: GFSK
- Frequency range	: 2 402 MHz ~ 2480 MHz
- Number of channel	: 40
- Antenna Type	: PCB pattern antenna
- Type of chain	: One
- Antenna specification	: Manufacturer : RadiNa Antenna type : PCB pattern antenna Peak Gain : 2.85 dBi
- Hardware version	: PLCCA1326A
- Software version	: V1.1.0.10711

3.2 Definition of models

-None.



3.3 Support Equipment / Cables used

3.3.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
None.	-	-	S/N: None. FCC ID.: N/A.

See “Appendix E – Test Setup Photographs” for actual system test set-up

3.3.2 System configuration

Description	Manufacturer	Model Name	S/N & FCC ID.
None.	-	-	S/N: - FCC ID.: -

3.3.3 Used Cable(s)

Cable Name	Condition	Description
None.	-	-

3.4 Modification Item(s)

-. None



4. Antenna Requirement - §15.203

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the applicant can be used with the device. The use of permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with this requirement.

4.1 Description of Antenna

The **LG Electronics Inc. RF Remote controller**, comply with the requirement of §15.203 with a built-in PCB printed antenna permanently attached to the transmitter.

5. Description of tests

5.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used.

The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency: 3 V / DC
- Operating condition during the test(s) :
 - Continuous RF transmitting mode with maximum RF output power.
 - The RF transmitting signal is DSSS modulation signal.

Operating channel frequency and moderation technology

Mode	Available channel	Type of Modulation
IEEE 802.15.1	0 ~ 39	GFSK



6. Radiated Spurious & Restricted Band Edge Emission

Exploratory Radiated measurements were conducted at the 3m semi anechoic chamber in order to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Final measurements of below 1GHz were made at 3m or 10 m Chamber that complies with CISPR 16/ANSI C63.10. Above 1GHz final measurements were conducted at the 3m Chamber only.

For measurements above 1GHz, the bottom side of 3m chamber was installed with absorbers in order to meet SVSWR Limit.

Exploratory measurements were scanned using Peak mode of EMI Test receiver and final measurements were measured with Quasi-Peak mode (Below 1GHz) and Peak & Average mode (Above 1GHz).

The measurements were performed by rotating the EUT 360° and adjusting the receive antenna height from 1.0 m to 4.0 m. All frequencies were investigated in both horizontal and vertical antenna polarity.

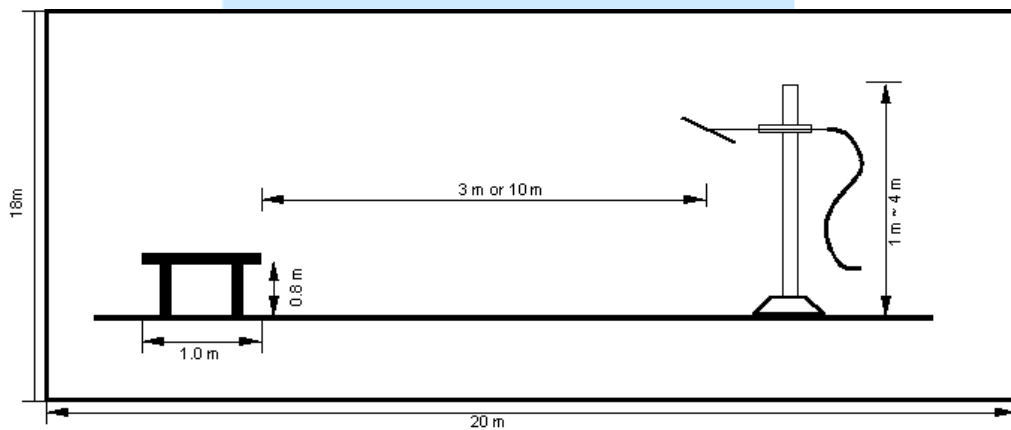


Fig 3. Dimensions of test site (Below 1GHz)

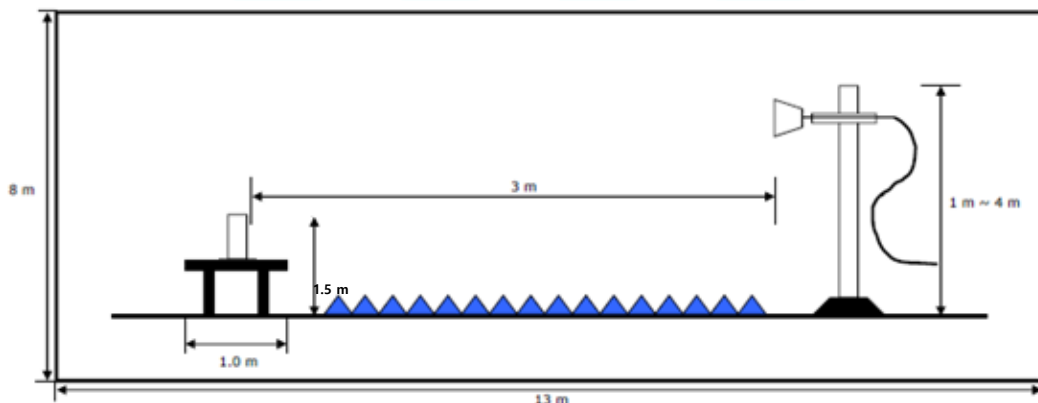


Fig 4. Dimensions of test site (Above 1GHz)



6.1 Operating environment

Temperature : 18.4 °C
Relative humidity : 31.3 % R.H.

6.2 Test set-up

A preliminary and final measurement was at 3 m anechoic chamber.

The EUT was placed on a non-conducting table.

For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane.

For emission measurements above 1 GHz, the table height is 1.5 m above the reference ground plane.

The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels.

This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.

The measurement uncertainty was given with a confidence of 95 %.

Test items(Anechoic Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	4.78 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	4.77 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	5.06 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	5.03 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (1 000 MHz ~ 6 000 MHz, 3 m, V/H)	5.42 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (6 000 MHz ~ 18 000 MHz, 3 m, V/H)	5.64 dB	Confidence level of approximately 95 % ($k = 2$)



6.4 Limit

20 dB in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2 400/F (kHz)	300
0.490 ~ 1.705	2 400/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

6.5 Test Equipment used

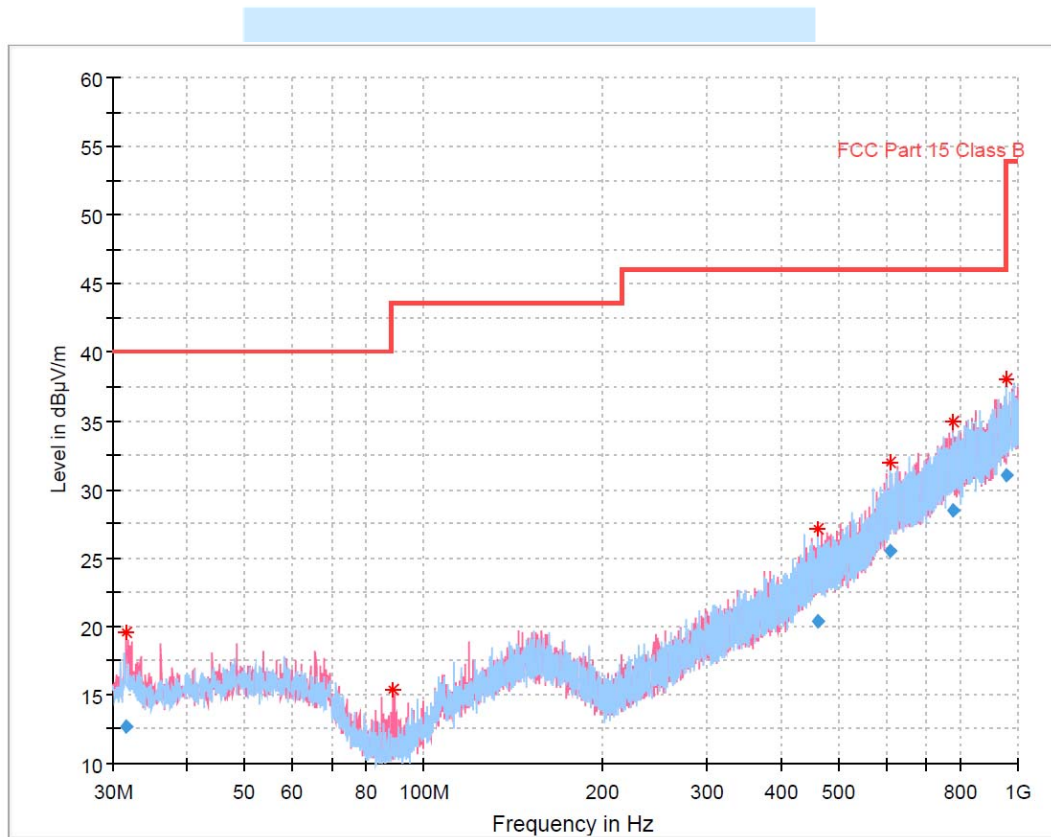
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESU40	Rohde & Schwarz	EMI Test Receiver	100266	Jul. 20, 2017
□ - HFH2-Z2	Rohde & Schwarz	Loop Antenna	100041	Dec. 21, 2017
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3099	Aug. 03. 2017
□ - BBHA9120D	Schwarzbeck	Horn Antenna	207	Oct. 14. 2017
□ - 3160-09	Schwarzbeck	Horn Antenna	LM3981	Nov. 29. 2017
■ - MCU066	maturo GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	maturo GmbH	Turntable	1390307	N/A
■ - AM 4.0	maturo GmbH	Antenna Mast	1390308	N/A
□ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	Jan. 05. 2017
□ - SCU-F1826-G47-BZ42-CSS	BONN Elektronik	Preamplifier	10003	Jan. 12. 2017



6.6 Test data for Radiated Spurious Emission

- Test Date : Dec. 06, 2016
- Reference Standard : Part 15 Subpart C, Sec. 15.247(d)
- Measuring Distance : 3 m
- Spectrum Resolution : 120 kHz
Bandwidth(6 dB)
- Detector mode : Quasi Peak detector mode / Peak detector mode
- Power Source : DC 3.0 V
- Note : Through three orthogonal axes were investigated and the worst case is report

Radiated Spurious Emission (30 MHz to 1 000 MHz): Lowest channel (2 480 MHz)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.676875	12.75	40.00	27.25	1000.0	120.000	100.0	V	229.0	12.4
88.687500	6.86	43.50	36.64	1000.0	120.000	189.0	V	191.0	9.4
460.077500	20.44	46.00	25.56	1000.0	120.000	275.0	H	15.0	21.7
610.380000	25.48	46.00	20.52	1000.0	120.000	375.0	H	33.0	25.2
779.537500	28.46	46.00	17.54	1000.0	120.000	385.0	V	10.0	28.2
957.010625	30.97	46.00	15.03	1000.0	120.000	225.0	H	4.0	30.8



7. Sample Calculations

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \text{ Log}_{10}(\mu\text{V}/\text{m}) \\ \text{dB}\mu\text{V} &= \text{dBm} + 107 \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)} \end{aligned}$$

7.1 Example 1 :

■ 20.3 MHz

Class B Limit = 250 μV = 48 dB μV
Reading = 39.2 dB μV
 $10^{(39.2\text{dB}\mu\text{V}/20)}$ = 91.2 μV
Margin = 48 dB μV - 39.2 dB μV
= 8.8 dB

7.2 Example 2 :

■ 66.7 MHz

Class B Limit = 100 $\mu\text{V}/\text{m}$ = 40.0 dB $\mu\text{V}/\text{m}$
Reading = 31.0 dB μV
Antenna Factor + Cable Loss = 5.8 dB
Total = 36.8 dB $\mu\text{V}/\text{m}$
Margin = 40.0 dB $\mu\text{V}/\text{m}$ - 36.8 dB $\mu\text{V}/\text{m}$
= 3.2 dB



8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. RF Remote controller (Model Name: LGE-MEDIA-SB1)** was complies with §15.247 of the FCC Rules.

- The end -

