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TEST REPORT

EMI Test for FCC Certification / ISED of MR20PJTR Model

APPLICANT

LG Electronics, Inc.

REPORT NO.

HCT-EM-2006-FI001-R1

DATE OF ISSUE

June 24, 2020

Tested by

Hyun-Jin Lim

(signature)

Technical Manager

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TEST REPORT

EMI Test for
FCC Certification
/ ISED

REPORT NO.

HCT-EM-2006-FI001-R1

DATE OF ISSUE

June 24, 2020

FCC ID. / IC

BEJMR20PJTR / 2703H-MR20PJTR

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

Product Name Magic Lighting Remote
Model Name MR20PJTR

Date of Test May 28, 2020 ~ June 04, 2020

Test Standard Used FCC Part15 Subpart B Class B

Test Results Refer to the present document

Manufacturer LG Electronics Inc.

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

This test results were applied only to the test methods required by the standard

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	June 09, 2020	Initial Release
1	June 24, 2020	Revised to KOLAS report

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014. (See Test Report if any modifications were made for compliance)
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 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.
HCT certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

The above testing certificate is the accredited test result by KOLAS (Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA.

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1. GENERAL INFORMATION

1.1 Description of EUT

FCC ID	BEJMR20PJTR
IC	2703H-MR20PJTR
Model Name	MR20PJTR
Product Name	Magic Lighting Remote
Frequency Range	2 402 MHz to 2 480 MHz (Bluetooth)
Power Rating	3.0 V (Min 2.4 V, Max 3.2 V)
Manufacturer	LG Electronics, Inc.
Factory's Information	Hansung Electronics Co., LTD 1. 49-29, Cheomdangieop 4-ro, Sandong-myeon, Gumi-si, Gyeongsangbuk-do, Korea

1.2 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

Device Type	Model Name	Serial Number	Manufacturer
EUT	MR20PJTR	-	LG Electronics

1.3 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	-	N/A	N/A	N/A

NOTE. The marked "(D)" means the data cable and "(P)" means the power cable.

1.4 Noise Suppression Parts on Cable (I/O Cable)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	-	N/A	N/A	N/A	-

NOTE. This product is a wireless remote controller, it does not have a port to connect peripherals and has a built-in battery (DC 3 V).

1.5 Test Facility

Test site is located at 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, South Korea. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4-2014. The Normalized site attenuations (30 MHz to 1 GHz) and Site validation (1 GHz to 18 GHz) were performed in accordance with the standard in ANSI C63.4-2014

Measurement Facilities	Designation No.
Radiated Field strength measurement facility 3 m Semi Anechoic chamber	KR0032
Radiated Field strength measurement facility 10 m Semi Anechoic chamber #1	
Radiated Field strength measurement facility 10 m Semi Anechoic chamber #2	
Filing the EMI Measurement Facility (3 m Semi Anechoic Chamber and Shielded Room)	IC 5944A-4
Filing the EMI Measurement Facility (10 m Semi-Anechoic Chamber)	IC 5944A-2

1.6 Calibration of Measuring Instrument

The measuring equipment, which was utilized in performing the tests documented herein, has been Calibrated in accordance with the manufacturers recommendations for utilizing calibration equipment, Which is traceable to recognized national standards. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5:2017

1.7 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty
Radiated Emissions (30 MHz to 1 GHz)	4.8 dB
Radiated Emissions (1 GHz to 18 GHz)	5.4 dB

2. DESCRIPTION OF TEST

2.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 7.3

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN).

If the EUT is connected to the PC through USB, the AC power-line adapter of the PC is directly connected to a line impedance stabilization network (LISN).

Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/50uH of coupling impedance for the measuring instrument.

b. Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.

c. The frequency range from 150 kHz to 30 MHz was searched.

Conducted Emission Limits

Frequency (MHz)	Resolution Bandwidth (kHz)	Class A		Class B	
		Quasi-Peak (dB μ V)	Average (dB μ V)	Quasi-Peak (dB μ V)	Average (dB μ V)
0.15 to 0.5	9	79	66	66 to 56*	56 to 46*
0.5 to 5	9	73	60	56	46
5 to 30	9	73	60	60	50

NOTE. Decreases with the logarithm of the frequency.

2.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 8.3

- a. The EUT was placed on the top of a turn table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from 1 m to 4 m above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 m to 4 m and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to Peak and Average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- g. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. (1 GHz to 40 GHz)

Radiated Emission Limits

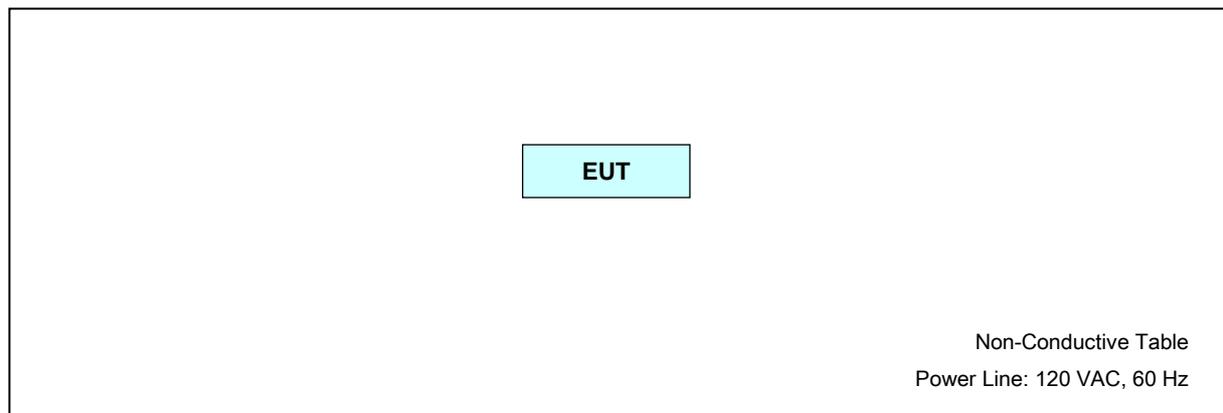
Frequency (MHz)	Class A			Class B		
	Antenna Distance (m)	Field Strength ($\mu\text{V}/\text{m}$)	Quasi-Peak ($\text{dB}\mu\text{V}/\text{m}$)	Antenna Distance (m)	Field Strength ($\mu\text{V}/\text{m}$)	Quasi-Peak ($\text{dB}\mu\text{V}/\text{m}$)
30 to 88	10	90	39.0	3	100	40.0
88 to 216	10	150	43.5	3	150	43.5
216 to 960	10	210	46.4	3	200	46.0
Above 960	10	300	49.5	3	500	54.0
Frequency (MHz)	Antenna Distance (m)	Class A		Class B		
		Peak ($\text{dB}\mu\text{V}/\text{m}$)	Average ($\text{dB}\mu\text{V}/\text{m}$)	Peak ($\text{dB}\mu\text{V}/\text{m}$)	Average ($\text{dB}\mu\text{V}/\text{m}$)	
Above 1 000	3	80	60	74	54	

2.2.1 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

2.3 Configuration of Tested System



3. PRELIMINARY TEST

3.1 Conducted Emission

It was tested the following operating mode, after connecting all peripheral devices.

Operating Modes: Not applicable

3.2 Radiated Emission

It was tested the following operating mode, after connecting all peripheral devices.

Operating Mode: Bluetooth Idle mode

4. CONDUCTED EMISSION AND RADIATED EMISSION TEST SUMMARY

4.1 Conducted Emission

4.1.1 Measuring instruments

Type	Manufacturer	Model Name	Serial Number	Calibration Cycle	Calibration Date
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	06.18.2019
<input type="checkbox"/> LISN	Rohde & Schwarz	ENV216	102245	1 year	09.11.2019
<input type="checkbox"/> LISN	Rohde & Schwarz	ENV216	100073	1 year	04.27.2020

4.1.2 Operating Condition

The test results of conducted emission at mains ports provide the following information:

Test Standard Used	FCC CFR 47 PART 15 Subpart B Class B ICES-003 Issue 6 Class B ANSI C63.4-2014
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operating Mode	Not applicable
Kind of Test Site	EMI Shielded Room
Temperature	- °C
Relative Humidity	- %
Test Date	-

NOTE. This product is a wireless remote controller, it does not have a port to connect peripherals and has a built-in battery (DC 3 V).

4.2 Radiated Emission Below 1 GHz

4.2.1 Measuring instruments

	Type	Manufacturer	Model Name	Serial Number	Calibration Cycle	Calibration Date
<input checked="" type="checkbox"/>	EMI test receiver	Rohde & Schwarz	ESU40	100524	1 year	05.12.2020
<input checked="" type="checkbox"/>	Trilog antenna	Schwarzbeck	VULB 9168	255	2 year	03.26.2019
<input checked="" type="checkbox"/>	Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
<input checked="" type="checkbox"/>	Antenna master controller	INNCO Systems	CO 3000	CO3000/870/		
<input checked="" type="checkbox"/>	Turn Table	INNCO Systems	1060	-	N/A	-
<input checked="" type="checkbox"/>	Turn table controller	INNCO Systems	CO2000	CO2000/095/ 7590304/L	N/A	-

4.2.2 Operating Condition

The test results of radiated emission provide the following information:

Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ICES-003 Issue 6 Class B ANSI C63.4-2014
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Operating Mode	Bluetooth Idle mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	21.8 °C
Relative Humidity	44.7 %
Test Date	May 28, 2020

4.2.3 Measuring Data

Frequency (MHz)	Quasi Peak (dB μ V/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
30.363825	24.8	225.0	V	276.0	18.3	15.2	40.0
55.514000	21.1	100.0	V	187.0	19.6	18.9	40.0
214.719800	26.6	100.0	V	83.0	17.3	16.9	43.5
222.823800	23.9	100.0	V	157.0	17.6	22.1	46.0
431.091600	24.9	100.0	V	63.0	23.5	21.1	46.0
699.511800	30.0	100.0	V	328.0	28.7	16.0	46.0

- Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. QuasiPeak = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor + Cable Loss
4. Margin = Limit - QuasiPeak

4.3 Radiated Emission Above 1 GHz

4.3.1 Measuring instruments

	Type	Manufacturer	Model Name	Serial Number	Calibration Cycle	Calibration Date
<input checked="" type="checkbox"/>	EMI test receiver	Rohde & Schwarz	ESU40	100524	1 year	05.12.2020
<input checked="" type="checkbox"/>	Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
<input checked="" type="checkbox"/>	Antenna master controller	INNCO Systems	CO3000	CO3000/870/ 35990515/L	N/A	-
<input checked="" type="checkbox"/>	Turn table	INNCO Systems	1060	-	N/A	-
<input checked="" type="checkbox"/>	Turn table controller	INNCO Systems	CO2000	CO2000/095/ 7590304/L	N/A	-
<input checked="" type="checkbox"/>	Low Noise amplifier	TESTEK	TK-PA18H	170034-L	1 year	03.03.2020
<input checked="" type="checkbox"/>	Horn antenna	Schwarzbeck	BBHA 9120D	01836	1 year	07.19.2019
<input type="checkbox"/>	Power Amplifier	TESTEK	TK-PA1840H	170030-L	1 year	02.13.2020
<input type="checkbox"/>	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170 #786	2 year	12.03.2019

4.3.2 Operating Condition

The test results of radiated emission provide the following information:

Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ICES-003 Issue 6 Class B ANSI C63.4-2014
Detector	Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz) CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)
Highest Frequency	2 480 MHz
Tested Frequency Range	1 GHz to 18 GHz
Operation Mode	Bluetooth Idle mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.5 °C
Relative Humidity	45.2 %
Test Date	June 04, 2020

4.3.3 Measuring Data

Frequency (MHz)	Peak (dB μ V/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
1194.940000	40.2	149.6	V	50.0	-28.8	33.8	74.0
1995.760000	41.1	150.0	V	12.0	-26.6	32.9	74.0
2396.185000	37.6	113.4	V	93.0	-24.6	36.4	74.0
2699.890000	35.6	100.0	V	207.0	-23.6	38.4	74.0
5887.770000	42.2	199.5	V	145.0	-16.5	31.8	74.0
9920.825000	43.5	100.0	V	158.0	-8.9	30.5	74.0

Frequency (MHz)	CAverage (dB μ V/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
1194.940000	17.1	149.6	V	50.0	-28.8	36.9	54.0
1995.760000	20.2	150.0	V	12.0	-26.6	33.8	54.0
2396.185000	20.7	113.4	V	93.0	-24.6	33.3	54.0
2699.890000	26.0	100.0	V	207.0	-23.6	28.0	54.0
5887.770000	36.8	199.5	V	145.0	-16.5	17.2	54.0
9920.825000	30.9	100.0	V	158.0	-8.9	23.1	54.0

- Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. Peak or CAverage = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor+ Cable Loss –Amplifier Gain
4. Margin = Limit - Peak or CAverage

5. CONCLUSION

The data collected shows that the **Product Name: Magic Lighting Remote, Model Name: MR20PJTR** complies with §15.107 and §15.109 of the FCC rules and ICES-003 Issue 6 of the IC rules.

6. APPENDIX A. TEST SETUP PHOTO

Please refer to Appendix. A and test setup photo file no. as follows;

File No.	Date of Issue	Description
HCT-EM-2006-FI001-P	June 09, 2020	Initial Release

End of report