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TEST REPORT

FCC/IC BT LE SAR Exclusion for MR21GC

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-SR-2008-FI002

DATE OF ISSUE
August 25, 2020

Technical Manager
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(signature) 

Accredited by KOLAS, Republic of KOREA

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Test for MR21GA

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Additional Model

-

Applicant

LG Electronics Inc.

222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do

Eut Type
Model Name

Magic Remote
MR21GC

FCC ID
IC

BEJMR21GC
2703H-MR21GC

Max. RF Output Power

8.0 dBm (6.31 mW)

Modulation type

GFSK

FCC Classification

Digital Transmission System(DTS)

FCC Rule Part(s)

47CFR §2.1093

IC Rule Part(s)

RSS-102 Issue 5; Health Canada Safety Code 6

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	August 25, 2020	Initial Release

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC / IC Rules under normal use and maintenance.

This laboratory is not accredited for the test results marked *.

The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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CONTENTS

1. EUT DESCRIPTION	5
2. FCC Exclusion result	6
3. ISED Exclusion result	7

1. EUT DESCRIPTION

Model	MR21GC
Additional Model	-
EUT Type	Magic Remote
Power Supply	DC 3.00 V
Frequency Range	2 402 MHz – 2 480 MHz
Max. RF Output Power[E.I.R.P]	8.0 dBm (6.31 mW)
Modulation Type	GFSK
Bluetooth Version	4.2
Number of Channels	40 Channels
Antenna Specification	Antenna type: PCB Antenna Peak Gain : 2.13 dBi
PMN (Product Marketing Number)	Magic Remote
HVIN (Hardware Version Identification Number)	MR21GC
FVIN (Firmware Version Identification Number)	1.0.489.6
HMN (Host Marketing Name)	N/A
EUT serial numbers	FCC : KOS088007H IC : KOS088007J

2. FCC Exclusion result

2.1 Lim SAR and Face SAR Test Exclusions Applied _Bluetooth 4.2 LE

Since this product is a remote control product, it is used by most users in the hand, so Limb SAR standard is applied. In addition, since this product is capable of voice recognition by the user, an exception evaluation is applied at a distance of 10 mm from the face SAR (head SAR).

According to the FCC KDB 447498 D01 v06 section 4.3.1, for 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, where

$$\frac{\text{Max Power of Channel(mW)}}{\text{Test Separation Distance (mm)}} * \sqrt{\text{Frequency(GHz)}} \leq 3.0 \text{ For 1g SAR, 7.5 for 10g SAR}$$

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

Calculation Result::

Tx frequency range: 2 402 MHz ~ 2 480 MHz

Limb SAR Consideration Min. test separation distance: 5 mm

Face SAR Consideration Min. test separation distance: 10 mm

Maximum Output Power: 6.31 mW

The Highest RF channel frequency: 2 480 MHz

For Face SAR Exclusion

Mode	Frequency	Maximum Allowed Power	Separation Distance	≤ 3.0 for 1g SAR
	[MHz]	[mW]	[mm]	
Bluetooth 4.2 LE	2 480	6.31	10	0.9

For Limb SAR exclusion

Mode	Frequency	Maximum Allowed Power	Separation Distance	≤ 7.5 for 10g SAR
	[MHz]	[mW]	[mm]	
Bluetooth 4.2 LE	2 480	6.31	5	1.9

Based on the maximum output power of Bluetooth 4.2 LE and antenna to use separation distance, Bluetooth 4.2 LE Limb SAR and Face SAR were not required.

3. ISED Exclusion result

3.1 SAR Test Exclusions Applied _Bluetooth 4.2 LE

Per RSS102 Issue 5, 2.5.1 Exemption Limits for Routine Evaluation

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance^{4,5}

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
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	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
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Calculation Result:

Tx frequency range: 2 402 MHz ~ 2 480 MHz

Maximum Output Power: 6.31 mW

The Highest RF channel frequency: 2 480 MHz

For Lim-worn SAR Exclusion:

Limb SAR Consideration Min. test separation distance: 5 mm

Linearly interpolated RF Exposure SAR exemption limit of the highest frequency (2480MHz) is 3.347mW

Exemption Limits for Limb SAR at 2480MHz is 3.347mW *2.5 = 8.3675 mW

For Face SAR Exclusion:

Face SAR Consideration Min. test separation distance: 10 mm

Linearly interpolated RF Exposure SAR exemption limit of the highest frequency (2480MHz) is 6.8533mW

The SAR exemption from RSS102: Issue 5 was also exempted by the above exclusion conditions.