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# TEST REPORT

FCC/IC BT LE Test for MR21GA  
Certification

APPLICANT  
LG Electronics Inc.

REPORT NO.  
HCT-SR-2008-FI001

DATE OF ISSUE  
August 25, 2020

Technical Manager  
Yun Jeang Heo

(signature) 

Accredited by KOLAS, Republic of KOREA

HCT CO., LTD.

  
Soo Chan Lee / CEO



HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA  
Tel. +82 31 634 6300 Fax. +82 31 645 6401

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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  
MR21GA

FCC ID  
IC

BEJMR21GA  
2703H-MR21GA

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)

\* The report shall not be reproduced except in full(only partly) without approval of the laboratory.

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## 1. EUT DESCRIPTION

|                                                  |                                                   |
|--------------------------------------------------|---------------------------------------------------|
| Model                                            | MR21GA                                            |
| 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)                                 |
| <b>Modulation Type</b>                           | GFSK                                              |
| Bluetooth Version                                | 4.2                                               |
| <b>Number of Channels</b>                        | 40 Channels                                       |
| Antenna Specification                            | Antenna type: PCB Antenna<br>Peak Gain : 1.82 dBi |
| PMN<br>(Product Marketing Number)                | Magic Remote                                      |
| HVIN<br>(Hardware Version Identification Number) | MR21GA                                            |
| FVIN<br>(Firmware Version Identification Number) | 1.0.489.6                                         |
| HMN<br>(Host Marketing Name)                     | N/A                                               |
| EUT serial numbers                               | FCC : KOS088007F<br>IC : KOS088007G               |

## 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  $\leq 50$  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  $\leq 50$  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  $\leq 7.5$  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 | $\leq 3.0$<br>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 | $\leq 7.5$<br>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<sup>4,5</sup>**

| 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.