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TEST REPORT

FCC /IC SAR Exclusion Report for MR22GA
Certification

APPLICANT

LG Electronics Inc.

REPORT NO.

HCT-SR-2106-FI001-R1

DATE OF ISSUE

June 28, 2021

Technical Manager
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(signature)

Accredited by KOLAS, Republic of KOREA

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<p>TEST REPORT FCC/ISED BT LE Test for MR22GA</p>	<p>REPORT NO. HCT-SR-2106-FI001-R1</p> <p>DATE OF ISSUE June 28, 2021</p> <p>Additional Model -</p>
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Applicant	LG Electronics Inc. 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea
Eut Type Model Name	Magic Remote MR22GA
FCC ID IC	BEJMR22GA 2703H-MR22GA
Max. RF Output Power	7 dBm (5 mW)
Modulation type	GFSK
FCC Classification	Digital Transmission System(DTS)
FCC Rule Part(s)	47CFR §2.1093
ISED 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	June 15, 2021	Initial Release
1	June 28, 2021	Revised pages 5, 6, 7

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 / ISED 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	MR22GA	
Additional Model	-	
EUT Type	Magic Remote	
Power Supply	DC 3.0 V	
Frequency Range	2 402 MHz – 2 480 MHz	
Max. RF Output Power (EIRP)	Peak	1M Bit/s : 7 dBm (5 mW)
	Average	1M Bit/s : 6.5 dBm (4 mW)
Modulation Type	GFSK	
Bluetooth Version	4.2	
Number of Channels	40 Channels	
Antenna Specification	Antenna type: PCB Antenna Peak Gain : 2.72 dBi	
PMN (Product Marketing Number)	Magic Remote	
HVIN (Hardware Version Identification Number)	MR22GA	
FVIN (Firmware Version Identification Number)	1.0.552.3	
HMN (Host Marketing Name)	N/A	
EUT serial numbers	Radiated: IH115D0441 Conducted :IH115D0440	
Manufacturer	<p>1. Hansung Electronics Co., LTD -Headquarters: 49-29, Cheomdangieop 4-ro, Sandong-myeon, Gumi-si, Gyeongsangbuk-do, Korea -Indonesia : Kawasan Industri Batik Lippo Cikarang Jl.Palemn 1Block Ds-6, Cibatu, Cikarang Selatan, Bekasi, Jawa Barat, Indonesia</p> <p>2. OHSUNG Electronics CO.,LTD. -Headquarters : 335-4, Sanho-daero, Gumi-si, Gyeongsangbuk-do, KOREA -China : No.188 Tunpu South Road, Qiushe Economic Development Zone, Tongli Town, Wujiang City, Jiangsu Province -Indonesia: Jl. Selayar Blok D7 Kawasan Industri MM 2100, Mekarwangi, Cikarang Barat 17845 Jawa Barat, Indonesia -Mexico : CERRADA CENTINELA 1719, PARQUE INDUSTRIAL CACHANILLA, MEXICALI, BAJA CALIFORNIA, MEXICO 21394</p>	

2. TEST METHODOLOGY

2.1 FCC

Limb 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

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

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: 5 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	5	10	0.8

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	5	5	1.6

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.

*note : "SAR Exemption threshold was calculated with worst case EIRP which is more conservative than conducted power."

2.2 ISED

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

For Limb-worn SAR Exclusion: $4\text{mW} * 2.5 = 10\text{ mW}$

For Face SAR Exclusion: 7 mW

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: 5 mW

The Highest RF channel frequency: 2 480 MHz

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

*note : "SAR Exemption threshold was calculated with worst case EIRP which is more conservative than conducted power."