

TEST REPORT

EMC Test for WR24GA

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-EM-2407-FC008

DATE OF ISSUE
July 26, 2024

Tested by
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Accredited by KOLAS, Republic of KOREA

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TEST REPORT

FCC Certification

REPORT NO.

HCT-EM-2407-FC008

DATE OF ISSUE

July 26, 2024

FCC ID.

BEJWR24GA

Applicant

LG Electronics Inc.

222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do,
17709, Republic of Korea

Product Name

Simple Remote

Model Name

WR24GA

Date of Test

07.17.2024 to 07.18.2024

Location of Test

☒ Permanent Testing Lab

☐ On Site Testing Lab

(Address: See clause 1.2)

Test Standard Used

FCC CFR 47 PART 15 Subpart B Class B
ANSI C63.4-2014

Test Results

Refer to the present document

Manufacturer

LG Electronics Inc.

Brand Name

LG

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	July 26, 2024	Initial Release

Notice

Content

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

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

Information provided by the applicant is marked **.

Test results provided by external providers are marked ***.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

This test report provides test result(s) under the scope accredited by the Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA.

(KOLAS (KS Q ISO/IEC 17025) Accreditation No. KT197)

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1. TESTING LABORATORY

1.1 General Information

Organization Name	HCT Co., Ltd.
Address	2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383. Rep. of Korea
Telephone	+82 31 645 6300
FAX	+82 31 645 6401

1.2 Location of the Test Site

The test site is located at the following address.;

Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383. Rep. of Korea
Telephone	+82 31 645 6300
FAX	+82 31 645 6401

2. GENERAL INFORMATION

2.1 Description of EUT

FCC ID.	BEJWR24GA
Model Name	WR24GA
Product Name	Simple Remote
Frequency Range	Bluetooth LE: 2402 MHz ~ 2480 MHz
Power Rating	DC 3 V
Manufacturer	LG Electronics Inc.

2.2 Power Source

During the test, the following power supply levels are utilized/provided.;

Power supply: DC 3 V

2.3 Tested System Details

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

Device Type	Model Name	Serial Number	Manufacturer
Simple Remote (EUT)	WR24GA	-	LG Electronics Inc.
Bluetooth Dongle	-	-	LG Electronics Inc
Notebook PC	NT550XEZ	-	SAMSUNG Electronics Co., Ltd.
Notebook PC Adapter	EP-TA845 001	-	SOLUM VINA COMPANY LIMITED

2.4 Cable Description

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

“(D)” data cable and “(P)” power cable.

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

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

2.6 Test Facility

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 and ANSI C63.4a-2017

Our laboratories are accredited and designated in accordance with the provisions of Radio Waves ACT and International Standard ISO/IEC 17025:2017. (National Radio Research Agency, CABID No. KR0032)

2.7 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.

2.8 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 UCISPR measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Test Item	Test Site (Chamber)	Expanded Uncertainty
Radiated Emission (30 MHz to 1 GHz)	3 m Semi Anechoic Chamber #1	5.8 dB
Radiated Emission (1 GHz to 18 GHz)	3 m Semi Anechoic Chamber #1	4.8 dB

3. DESCRIPTION OF TEST

3.1 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 $50\ \Omega$ / $50\ \mu\text{H}$ 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 ranges from 150 kHz to 30 MHz was searched.

Conducted Emission Limits

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

NOTE. The more stringent limit applies at transition frequencies.

[*] The limit level in dB μ V decreases linearly with the logarithm of frequency.

3.2 Measurement of Radiated Emission

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

- 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.
- The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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.
- 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.
- 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

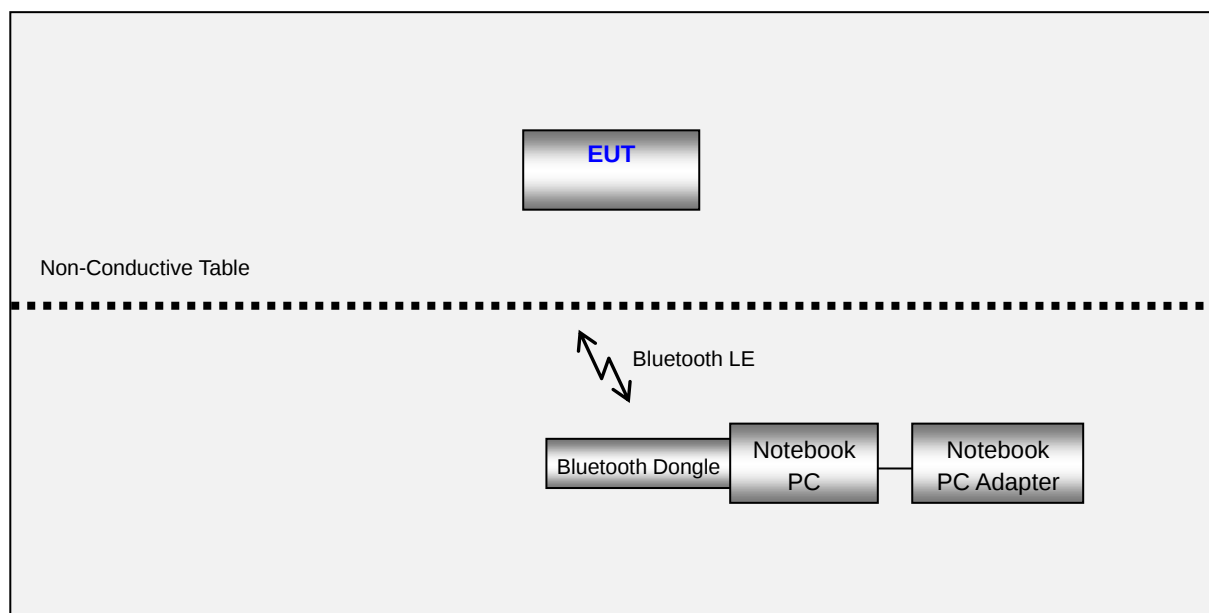
Frequency (MHz)	Class A			Class B		
	Antenna Distance (m)	Field Strength ($\mu\text{V/m}$)	Quasi-Peak (dB $\mu\text{V/m}$)	Antenna Distance (m)	Field Strength ($\mu\text{V/m}$)	Quasi-Peak (dB $\mu\text{V/m}$)
30 to 88	10	90	39.0	3	100	40.0
88 to 216	10	150	43.5	3	150	43.5
216 to 960	10	210	46.4	3	200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

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

3.3 Configuration of Tested System



4. OPERATION OF THE EUT

During preliminary test and final tests, the following operating mode was investigated.
It was tested the following operating mode, after connecting all peripheral devices.

Operating Mode:

Bluetooth LE + Voice Operating Mode

The EUT and the Bluetooth dongle are in continuous communication, and the EUT was tested under voice recognition with the microphone running.

NOTE.

This product uses built-in battery as power source.(AAA alkaline batteries 1.5 V * 2 EA)

5. MEASURING INSTRUMENTS

Type	Model Name	Manufacturer	Serial Number	Calibration Cycle	Next Calibration Date
Conducted emission					
☐	LISN	ENV4200	Rohde & Schwarz	100054	1 year 01.09.2025
☐	LISN	ENV216	Rohde & Schwarz	102246	1 year 11.20.2024
☐	LISN	ENV216	Rohde & Schwarz	100073	1 year 05.07.2025
☐	Software	EMC32	Rohde & Schwarz	-	- -
Radiated emission below 1 GHz					
☒	EMI Test Receiver	ESU40	Rohde & Schwarz	100524	1 year 05.07.2025
☒	Bilog Antenna	VULB9168	Schwarzbeck	255	2 year 03.10.2025
☒	Antenna master	MA4640-XP-ET	INNCO SYSTEM	-	N/A -
☒	Turn Table	1060	INNCO SYSTEM	-	N/A -
☐	DC Power Supply	PWS-3003D	Protek	04050810	1 year 11.10.2024
☒	Software	EMC32	Rohde & Schwarz	-	- -
Radiated emission above 1 GHz					
☒	EMI test receiver	ESU40	Rohde & Schwarz	100524	1 year 05.07.2025
☒	Horn Antenna	HF907	Rohde & Schwarz	103160	1 year 10.16.2024
☒	Power Amplifier	TK-PA18H	TESTEK	170034-L	1 year 11.01.2024
☐	Horn Antenna	BBHA 9170	Schwarzbeck	BBHA 9170 #786	1 year 11.01.2024
☐	Power Amplifier	TK-PA1840H	TESTEK	170030-L	1 year 02.20.2025
☒	Antenna master	MA4640-XP-ET	INNCO SYSTEM	-	N/A -
☒	Turn Table	1060	INNCO SYSTEM	-	N/A -
☐	DC Power Supply	PWS-3003D	Protek	04050810	1 year 11.10.2024
☒	Software	EMC32	Rohde & Schwarz	-	- -

6. EMISSION TEST SUMMARY

6.1 Conducted Emission (Not Applicable)

6.1.1 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 ANSI C63.4-2014
Frequency Range	0.15 MHz to 30 MHz
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Test Site	EMI Shield Room
Temperature	min. - °C, max. - °C
Relative Humidity	min. - %, max. - %
Test Date	---

A Conducted emission is calculated by the following equation:

Calculation Formula: QuasiPeak or CAverage= Receiver Reading + Corr.
Corr. = LISN Factor + Cable Loss
Margin = Limit – QuasiPeak or CAverage

The measurements from both Live (L1) and Neutral (N) of the LISN are combined into a single graph.

REMARK.

Since this product uses batteries, this test does not apply.

6.1.2 Measurement Data

Not applicable

6.2 Radiated Emission Below 1 GHz

6.2.1 Operating Condition

The test results of radiated emission provide the following information:

Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ANSI C63.4-2014
Frequency Range	30 MHz to 1 000 MHz
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Antenna Height	1 m to 4 m
Antenna Polarity	Horizontal, Vertical
Operating Mode	Bluetooth LE + Voice Operating Mode
Test Site	3 m Semi Anechoic Chamber #1
Temperature	min. 22.8 °C, max. 25.3 °C
Relative Humidity	min. 42.5 %, max. 45.7 %
Test Date	07.17.2024

A field strength is calculated by the following equation.

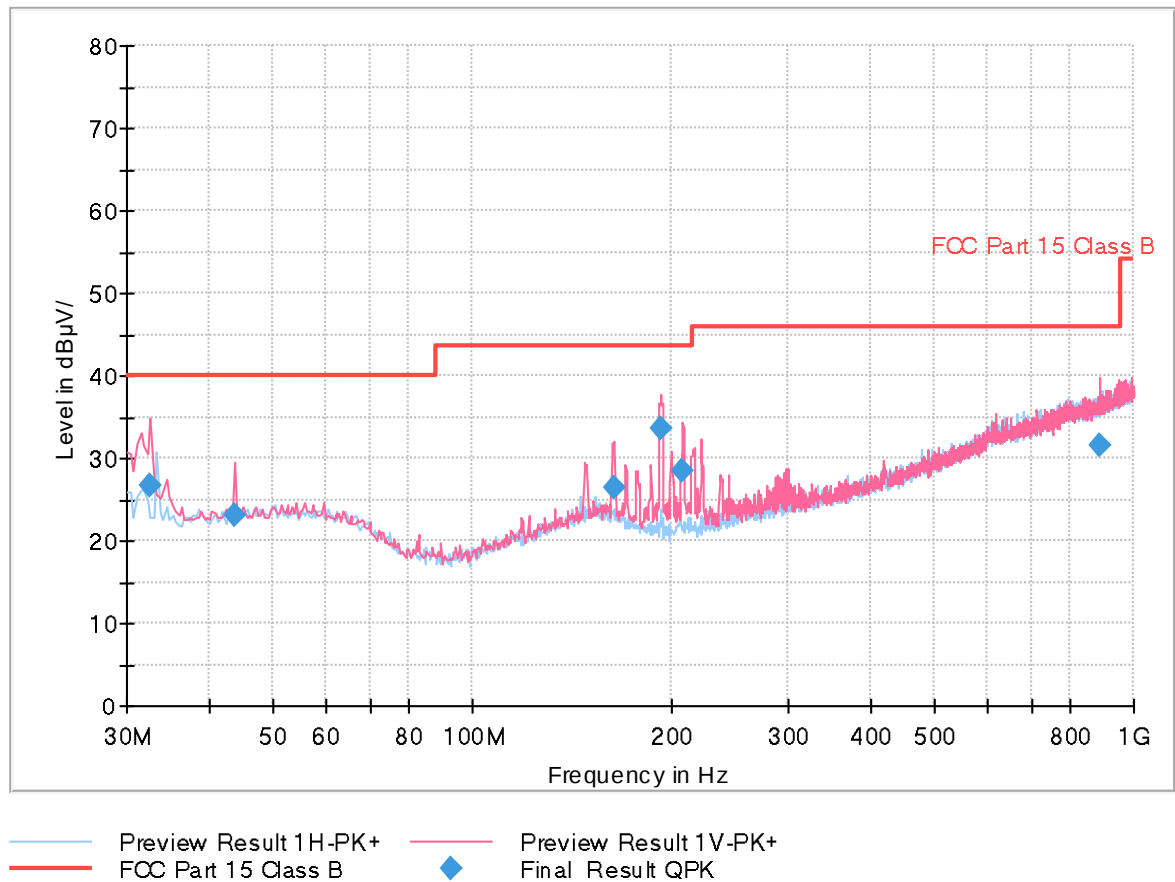
$$\begin{aligned}
 \text{Calculation Formula: } \text{QuasiPeak} &= \text{Reading (Receiver Reading)} + \text{Corr.} \\
 \text{Corr. (Correction Factor)} &= \text{Antenna Factor} + \text{Cable Loss} \\
 \text{Margin} &= \text{Limit} - \text{QuasiPeak}
 \end{aligned}$$

The measurements' polarities are H and V, where H means horizontal and V means vertical.

5.2.2 Measurement Data

Bluetooth LE + Voice Operating Mode

Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.6534	26.70	40.00	13.30	199.8	V	241.0	18.9
43.8215	23.20	40.00	16.80	321.9	V	106.0	19.9
163.9754	26.42	43.50	17.08	125.3	V	202.0	19.6
192.9866	33.70	43.50	9.80	100.0	V	0.0	17.5
207.9801	28.56	43.50	14.94	100.0	V	192.0	17.5
887.7402	31.50	46.00	14.50	100.0	V	3.0	31.4

6.3 Radiated Emission Above 1 GHz

6.3.1 Operating Condition

The test results of radiated emission provide the following information:

Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ANSI C63.4-2014
Detector	Peak, CISPR-Average
Bandwidth	1 MHz
Highest Frequency	2480 MHz
Tested Frequency Range	1 GHz to 18 GHz
Antenna Height	1 m to 4 m
Antenna Polarity	Horizontal, Vertical
Operating Mode	Bluetooth LE + Voice Operating Mode
Test Site	3 m Semi Anechoic Chamber #1
Temperature	min. 23.1 °C, max. 25.6 °C
Relative Humidity	min. 41.8 %, max. 45.1 %
Test Date	07.18.2024

A field strength is calculated by the following equation.

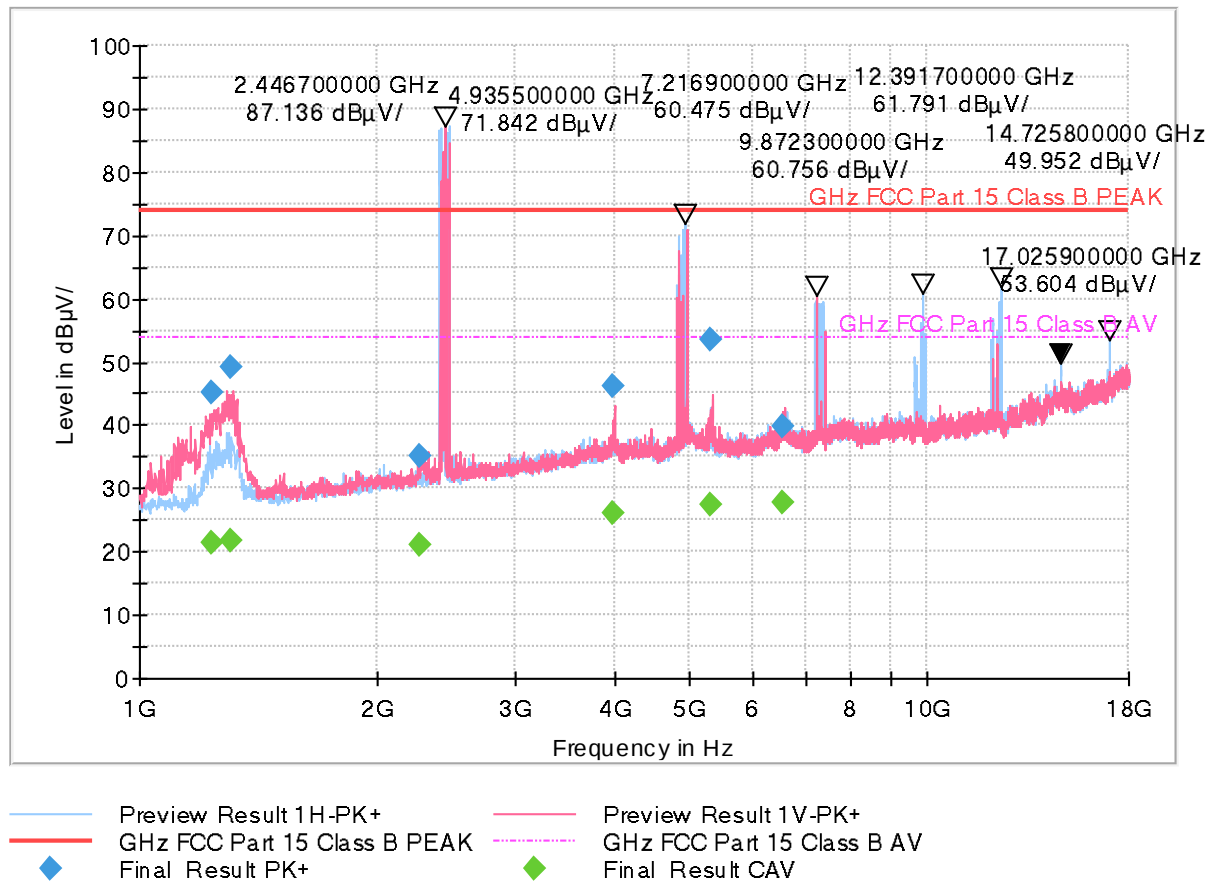
Calculation Formula: Peak or CAverage = Reading (Receiver Reading) + Corr.
Corr. (Correction Factor) = Antenna Factor+ Cable Loss –Amplifier Gain
Margin = Limit - Peak or CAverage

The measurements' polarities are H and V, where H means horizontal and V means vertical.

6.3.2 Measurement Data

Bluetooth LE + Voice Operating Mode

Full Spectrum



Final_Result_PK+

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1237.6700	45.22	74.00	28.78	305.8	V	98.0	-30.3
1308.6900	49.19	74.00	24.81	116.4	V	327.0	-30.0
2261.8350	35.21	74.00	38.79	325.1	V	276.0	-24.8
3981.6900	46.11	74.00	27.89	284.5	V	289.0	-17.7
5313.4000	53.52	74.00	20.48	198.7	V	186.0	-14.3
6568.0150	39.83	74.00	34.17	301.6	V	2.0	-12.1

Final_Result_CAV

Frequency (MHz)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1237.6700	21.46	54.00	32.54	305.8	V	98.0	-30.3
1308.6900	21.83	54.00	32.17	116.4	V	327.0	-30.0
2261.8350	20.99	54.00	33.01	325.1	V	276.0	-24.8
3981.6900	25.95	54.00	28.05	284.5	V	289.0	-17.7
5313.4000	27.58	54.00	26.42	198.7	V	186.0	-14.3
6568.0150	27.62	54.00	26.38	301.6	V	2.0	-12.1

Bluetooth LE Fundamental Frequency: 2.4467 GHz

Bluetooth LE Harmonic Frequency: 4.9355 GHz, 7.2169 GHz, 9.8723 GHz, 12.3917 GHz, 14.7258 GHz, 17.0259 GHz

7. 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-2407-FC008-P	July 26, 2024	Initial Release

End of report