ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No.	**: OT-209-RED-049**
Reception No.	**: 2007002663**
Applicant	**: LG Electronics USA, Inc.**
Address	**: 111 Sylvan Ave, North Building, Englewood Cliffs, New Jersey, 07632, United States**
Manufacturer	**: LG Electronics Inc.**
Address	**: 222 LG-ro Jinwi-myeon, Pyeongtaek-si,Gyeonggi-do, Korea**
Type of Equipment	**: Bluetooth Earbud**
Model Names	**: TONE-FN7**
Multiple Model Name	**: HBS-FN7, HBS-TFN7, HBS-FN7W**
Serial number	**: N/A**
Total page of Report	**: 17 pages (including this page)**
Date of Incoming	**: September 04, 2020**
Date of Issuing	**: September 11, 2020**

SUMMARY

The equipment complies with the requirement of ***FCC CFR 47 PART 15 SUBPART B, Section 15.101 and IC ICES-003 Issue 6.***

This test report contains only the results of a single test of the sample supplied for the examination.

Reviewed by: Seung-Hyun, Park / Manager
EMC Testing Div.
ONETECH Corp.

Approved by: Eung-Chan, Kim / General Manager
EMC Testing Div.
ONETECH Corp..

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Rev. No.	Issued Report No.	Issued Date	Revisions	Section Affected
0	OT-209-RED-049	September 11, 2020	Initial Issue	All

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1. VERIFICATION OF COMPLIANCE

-. Applicant : LG Electronics USA, Inc.

-. Address : 111 Sylvan Ave, North Building, Englewood Cliffs, New Jersey, 07632, United States

-. Manufacturer : LG Electronics Inc.

-. Address : 222 LG-ro Jinwi-myeon, Pyeongtaek-si,Gyeonggi-do, Korea

-. Factory : BLUECOM

-. Address : C5-4, Area CN1, Trang Due Industrial Park, An Duong District, Haiphong City, Vietnam

-. MODEL NAME : TONE-FN7

-. SERIAL NUMBER : N/A

-. BRAND/TRADE NAME : LG Electronics Inc.

-. DATE : September 11, 2020

EQUIPMENT CLASS	Other Class B digital devices & peripherals
E.U.T. DESCRIPTION	Bluetooth Earbud
MEASUREMENT PROCEDURES	Original Grant
TYPE OF EQUIPMENT TESTED	ANSI C63.4: 2014 and ICES-003 ISSUE 6
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Supplier's Declaration of Conformity (SDoC)
STANDARDS	FCC PART 15 (Class B) ICES-003 ISSUE 6 Class B Apparatus
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	10 m Semi anechoic chamber

ONETECH Corp. tested the above equipment in accordance with the requirements set forth in the above standard. The test results show that equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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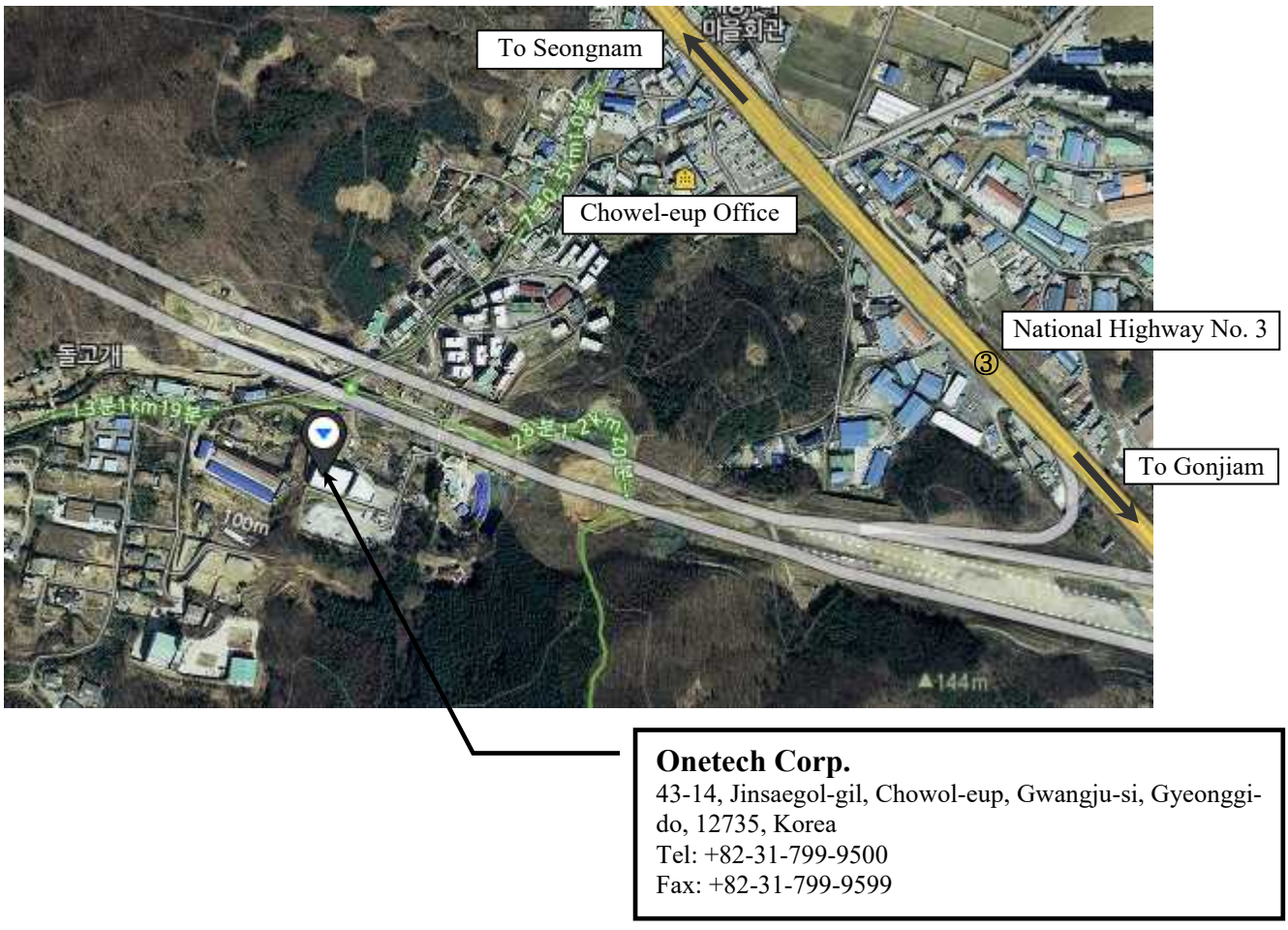
2. TEST FACILITY

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025 by Radio Research Agency as accreditation body. The Onetech Corp. is accredited for measuring devices subject to Declaration of Conformity (DOC) under Parts 15 & 18 as a Conformity Assessment Body (CAB) with designation number KR0013.

These measurement tests were conducted at Onetech Corp.

The 10 m semi anechoic chamber and conducted measurement facilities are located at

1) 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.
2) 12-5, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.



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Tel: +82-31-799-9500
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3. PRODUCT INFORMATION

3.1 Description of EUT

The LG Electronics USA, Inc., Model TONE-FN7 (referred to as the EUT in this report) is a Bluetooth Earbud.

Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
LIST OF EACH OSC. or CRY. FREQ. (FREQ. >= 1 MHz)	26 MHz
RF FREQ.	2 402 MHz ~ 2 480 MHz
ELECTRICAL RATING	DC 3.7 V (Built-in battery)
NUMBER OF PCB LAYERS	-
EXTERNAL CONNECTOR	USB Type C (Charge port)
Temperature Range	0 °C ~ 40 °C

3.2 Model Differences

-. The following lists consist of the added model and their differences.

Model Name	Differences			Tested
	Wireless Charging	UV-C LED	C-type Charging	
TONE-FN7	O	X	O	☐
HBS-FN7	O	O	O	☑
HBS-FN7W	O	X	O	☐
HBS-TFN7	O	O	O	☐

Note: 1. Applicant consigns only basic model to test, therefore this test report just guarantees the units which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

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3.3 Support Equipment

The model numbers for all the equipments that were used in the tested system is:

Description	Model	Manufacturer	Connected to
Bluetooth Earbud (EUT)	HBS-TFN7	LG Electronics Inc.	Adapter
Adapter	A1487	Flextronics Power Systems(Dongguan) Co., Ltd.	EUT, Wireless Charger
Wireless Charger	ML-00101B	Shenzhen HDC Electronics Co., Ltd.	Adapter

3.4 System Configuration

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Bluetooth Earbud	LG Electronics Inc.	HBS-FN7	ZNFHBSFN7

3.5 Cable Description for the EUT

Cable	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
USB Type C	Y	N	N	1.0	Adapter

3.6 Equipment Modifications

-. None

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4. DESCRIPTION OF TESTS

4.1 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2014.

Radiated testing was performed at a distance of 10 m from EUT to the antenna.

4.2 Test Condition

The test conditions of the noted test mode(s) in this test report are;

1) Test Voltage / Frequency

-. AC 120 V / 60 Hz

2) Test Mode(s)

Test Mode		Operating States
1	Charging	a) The USB Type C port on the EUT was connected to the adapter and then the EUT was operated while charging and UV-C LED operate.
2	Wireless Charging *)	a) The USB Type C port on the Wireless Charger was connected to the adapter and then the EUT was operated while charging

*) The EUT was wireless charging during the test.

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4.3 Conducted Emission

The EUT was placed on a non-conductive 1.0 m × 1.5 m table, which is 0.8 m in height above the reference ground plane and 0.4 m away from the vertical conducting plane (over 2 m × 2 m) that is bonded to the reference ground plane.

The power of EUT is fed through a 50 Ω/ 50 μH + 5 Ω LISN and all support equipment is powered from another LISN. Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver.

Exploratory measurements were conducted to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Exploratory measurements were scanned using Peak mode of EMI Test receiver from 150 kHz to 30 MHz with 20 ms sweep time. The final measurements were measured with Quasi-Peak and CISPR Average mode.

The bandwidth of EMI Test Receiver was set to 9 kHz. Interface cables were connected to the available interface ports of the test unit. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

4.4 Radiated Emission

Exploratory Radiated measurements were conducted at the 3 m semi anechoic chamber in order to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Final measurements were made at 10 m semi anechoic chamber that complies with CISPR 16/ANSI C63.4/ ICES-003.

Exploratory measurements were scanned using Peak mode of EMI Test receiver and final measurements were measured with Quasi-Peak mode (Below 1 GHz) and Peak & CISPR Average mode (Above 1 GHz).

The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

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5. FINAL RESULT OF MEASUREMENT

Exploratory measurement was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Emission Test

5.1.1 Operating Environment

Ambient temperature : 23.5 °C
Relative humidity : 60.2 % R.H.

5.1.2 Test Setup

The EUT and other support equipment were placed on a non-conductive table, 0.8 m height above the reference ground plane. The power of EUT was fed through a 50 Ω/ 50 μH + 5 Ω LISN. The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

5.1.3 Measurement uncertainty

Conducted emission on AC mains, quasi-peak detection : ± 2.2 dB
Conducted emission on AC mains, CISPR-average detection : ± 2.2 dB
Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, k = 2.

5.1.4 Limit

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	CISPR Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50
* Decreases with the logarithm of the frequency		

5.1.5 Test Equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESCI	Rohde & Schwarz	Test Receiver	101420	Mar. 23, 2020 (1Y)
■ -	NSLK 8126	Schwarzbeck	LISN	8126-480	Oct. 21, 2019 (1Y)
☐ -	3825/2	EMCO	AMN	9109-1867	Mar. 23, 2020 (1Y)
■ -	11947A	Hewlett Packard	Transient Limiter	3107A02762	Mar. 23, 2020 (1Y)

All test equipment used is calibrated on a regular basis.

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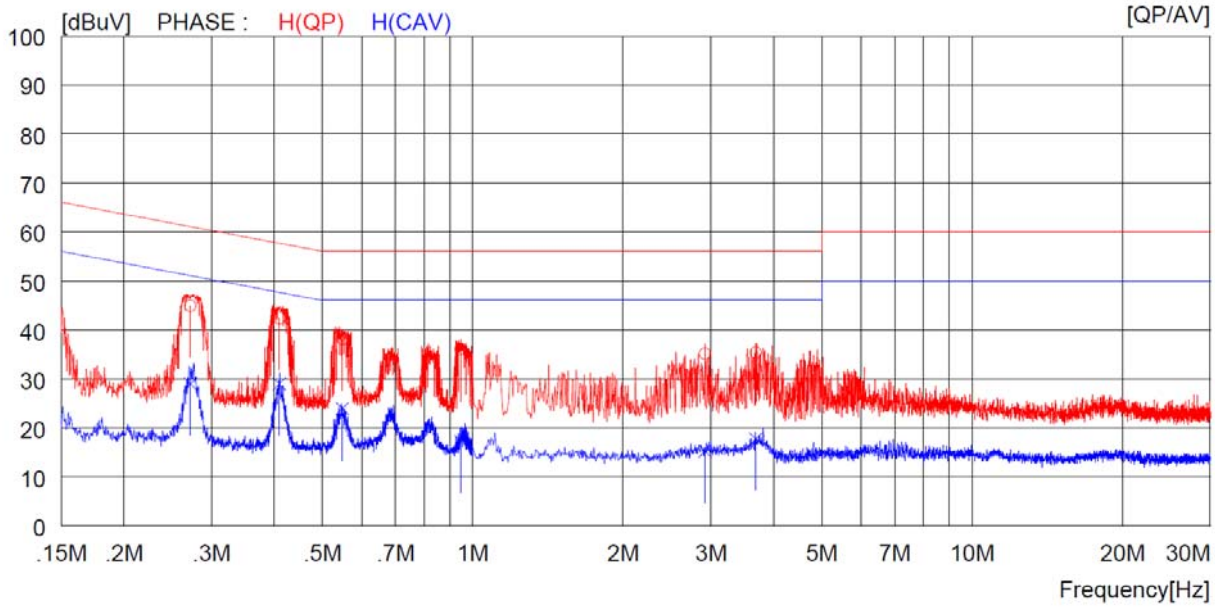
5.1.6 Test Data

. Test Result : Pass

Tested by: Su-Jin, Kang / Engineer

Test Mode 1 (Charging)			
Frequency range	: 0.15 MHz ~ 30 MHz	Test Date	: September 09, 2020
Resolution bandwidth	: 9 kHz	Tested Line	: HOT LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.27200	34.7	----	10.2	44.9	----	61.1	----	16.2	----	H(QP)
2	0.41000	32.2	----	10.2	42.4	----	57.6	----	15.2	----	H(QP)
3	0.54800	27.9	----	10.2	38.1	----	56.0	----	17.9	----	H(QP)
4	0.94700	25.7	----	10.3	36.0	----	56.0	----	20.0	----	H(QP)
5	2.92000	24.8	----	10.3	35.1	----	56.0	----	20.9	----	H(QP)
6	3.68800	25.0	----	10.3	35.3	----	56.0	----	20.7	----	H(QP)
7	0.27200	----	18.8	10.2	----	29.0	----	51.1	----	22.1	H(CAV)
8	0.41000	----	18.8	10.2	----	29.0	----	47.6	----	18.6	H(CAV)
9	0.54800	----	13.7	10.2	----	23.9	----	46.0	----	22.1	H(CAV)
10	0.94700	----	6.9	10.3	----	17.2	----	46.0	----	28.8	H(CAV)
11	2.92000	----	4.9	10.3	----	15.2	----	46.0	----	30.8	H(CAV)
12	3.68800	----	7.4	10.3	----	17.7	----	46.0	----	28.3	H(CAV)

Remark: Margin (dB) = Limit – Level (Result)

The result level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

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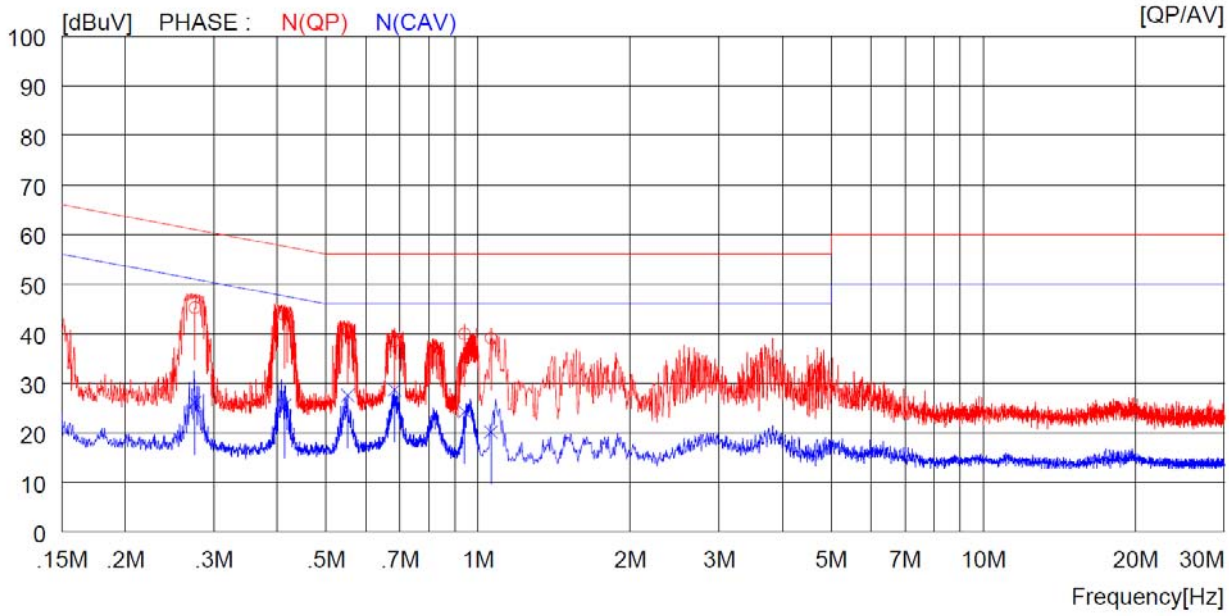
Test Mode 1 (Charging)			
Frequency range	: 0.15 MHz ~ 30 MHz	Test Date	: September 09, 2020
Resolution bandwidth	: 9 kHz	Tested Line	: NEUTRAL LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.27500	35.0	----	10.2	45.2	----	61.0	----	15.8	----	N(QP)
2	0.41400	33.4	----	10.2	43.6	----	57.6	----	14.0	----	N(QP)
3	0.55200	30.2	----	10.2	40.4	----	56.0	----	15.6	----	N(QP)
4	0.68300	28.3	----	10.2	38.5	----	56.0	----	17.5	----	N(QP)
5	0.94100	29.6	----	10.3	39.9	----	56.0	----	16.1	----	N(QP)
6	1.06000	28.8	----	10.3	39.1	----	56.0	----	16.9	----	N(QP)
7	0.27500	----	15.9	10.2	----	26.1	----	51.0	----	24.9	N(CAV)
8	0.41400	----	15.3	10.2	----	25.5	----	47.6	----	22.1	N(CAV)
9	0.55200	----	17.3	10.2	----	27.5	----	46.0	----	18.5	N(CAV)
10	0.68300	----	18.4	10.2	----	28.6	----	46.0	----	17.4	N(CAV)
11	0.94100	----	13.9	10.3	----	24.2	----	46.0	----	21.8	N(CAV)
12	1.06000	----	9.8	10.3	----	20.1	----	46.0	----	25.9	N(CAV)

Remark: Margin (dB) = Limit – Level (Result)

The result level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

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5.2 Radiated Emission Test

5.2.1 Operating Environment

Ambient temperature : 23.6 °C
Relative humidity : 57.4 % R.H.

5.2.2 Test Setup

The radiated emissions measurements were on the 10 m, in 10 m semi anechoic chamber. The EUT and all local support equipments were placed on a non-conductive turntable approximately 0.8 m above the ground plane.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

5.2.3 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 1 000 MHz : ± 4.5 dB
Radiated emission electric field intensity, 1 GHz ~ 18 GHz : ± 5.0 dB
Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

5.2.4 Limit

Frequency of Emission (MHz)	Resolution bandwidth	Field strength @ 3 m (dBμV/m)	
		Quasi-peak	
30 ~ 88	120 kHz	40.0	
88 ~ 216		43.5	
216 ~ 230		46.0	
230 ~ 960		46.0	
960 ~ 1 000		54.0	
		Peak Limit	CISPR Average Limit
> 1 000	1 MHz	74.0	54.0

*Alternative to Limits for radiated disturbance of CISPR22 class B ITE at a measuring distance of 10 m

Frequency of Emission (MHz)	Resolution bandwidth	Field strength @ 10 m (dBμV/m)
		Quasi-peak
30 ~ 230	120 kHz	30.0
230 ~ 1 000		37.0

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5.2.5 Test Equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESR	Rohde & Schwarz	Test Receiver	102190	Oct. 16, 2020 (1Y)
■ -	8447D	Hewlett Packard	Amplifier	2944A07777	Mar. 16, 2020 (1Y)
■ -	VULB9163	Schwarzbeck	Trilog Broadband Antenna	9163-419	Mar. 20, 2020 (1Y)
■ -	CO3000	Innco Systems GmbH	Controller	CO3000/1015	N/A
■ -	DT5000	Innco Systems GmbH	Turn Table	DT5000/3t	N/A
■ -	MA4000-EP	Innco Systems GmbH	Antenna Master	MA4000/508	N/A
☐	MA-4640-XPET	Innco Systems GmbH	Antenna Master	MA4640/592	N/A

All test equipment used is calibrated on a regular basis.

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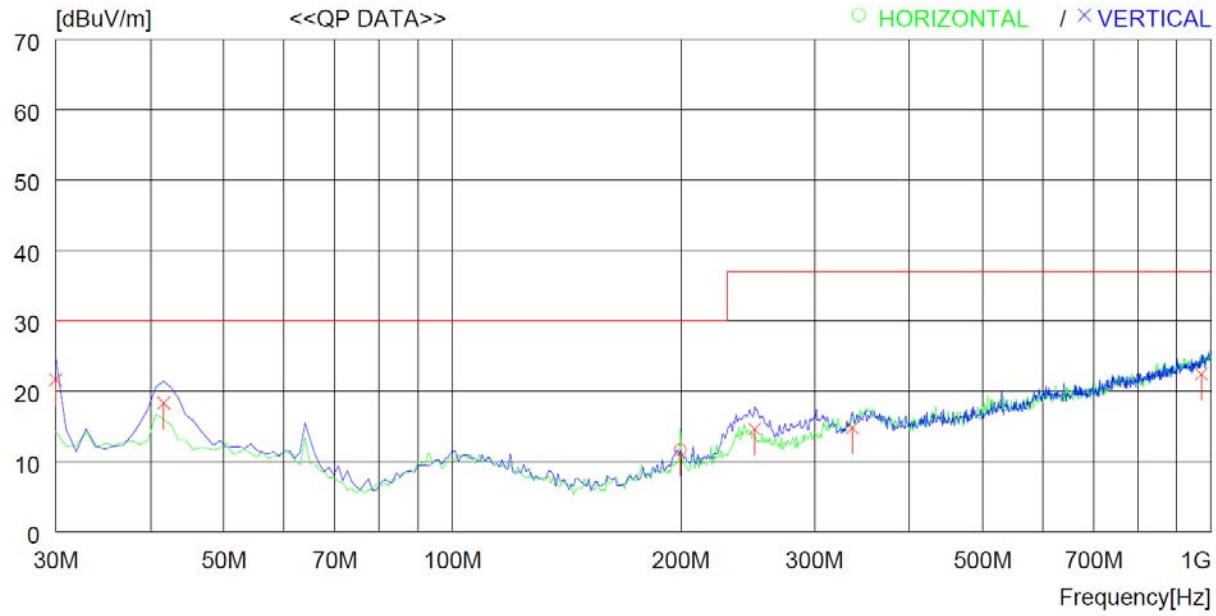
5.2.6 Test Data

. Test Result : Pass

Tested by: Su-Jin, Kang / Engineer

Test Mode 1 (Charging)			
Frequency range	: 30 MHz ~ 1 000 MHz	Test Date	: September 09, 2020
Resolution bandwidth	: 120 kHz	Measurement distance	: 10 m
Detector Mode	: Quasi-Peak		



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	199.750	24.7	10.3	4.3	27.7	11.6	30.0	18.4	200	216
----- Vertical ------										
2	30.000	35.2	13.1	1.6	28.3	21.6	30.0	8.4	100	352
3	41.640	30.5	14.4	1.8	28.4	18.3	30.0	11.7	300	159
4	250.190	24.7	12.5	4.9	27.5	14.6	37.0	22.4	100	12
5	336.520	22.3	14.5	5.7	27.7	14.8	37.0	22.2	100	85
6	969.917	16.6	22.7	10.7	27.6	22.4	37.0	14.6	100	0

Remark: Margin (dB) = Limit – Result

Result = Reading Quasi-Peak + Antenna Factor + Loss – Gain

Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

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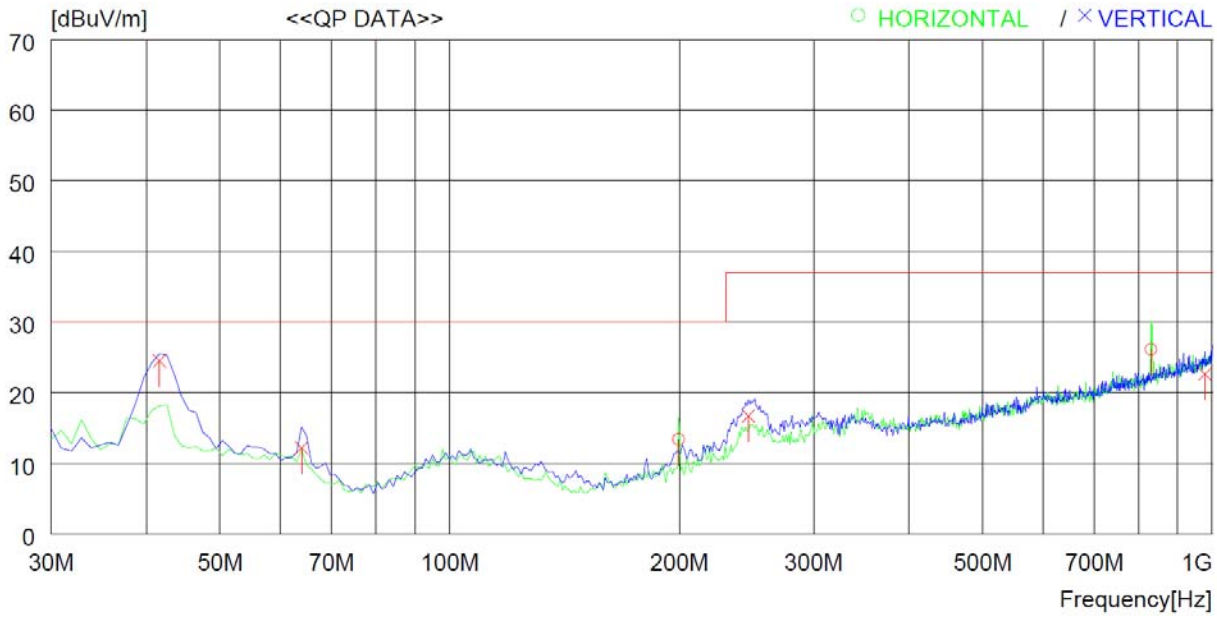
Test Mode 2 (Wireless Charging)			
Frequency range	: 30 MHz ~ 1 000 MHz	Test Date	: September 09, 2020
Resolution bandwidth	: 120 kHz	Measurement distance	: 10 m
Detector Mode	: Quasi-Peak		



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	199.750	26.5	10.3	4.3	27.7	13.4	30.0	16.6	400	0
2	831.211	23.4	21.2	9.7	28.2	26.1	37.0	10.9	200	0
----- Vertical ------										
3	41.640	36.7	14.4	1.8	28.4	24.5	30.0	5.5	100	0
4	63.950	26.1	12.0	2.4	28.3	12.2	30.0	17.8	400	359
5	246.310	27.0	12.4	4.9	27.6	16.7	37.0	20.3	100	54
6	977.677	16.6	22.9	10.7	27.6	22.6	37.0	14.4	400	359

Remark: Margin (dB) = Limit – Result

Result = Reading Quasi-Peak + Antenna Factor + Loss – Gain

Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

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6. SAMPLE CALCULATIONS

$dB\mu V = 20 \log_{10} (\mu V)$

Margin = Limit - Result

-. Example 1: 0.41400 MHz

Class B Limit	= 57.6 dBμV (Quasi-peak)
Reading	= 33.4 dBμV
Correction Factor	= Cable Loss + Pulse Limiter
	= 10.2 dB
Total	= 43.6 dBμV
Margin	= 57.6 dBμV – 43.6 dBμV
	= 14.0 dB

-. Example 2: 41.640 MHz

Class B Limit	= 30.0 dBμV/m (Quasi-peak)
Reading	= 36.7 dBμV
Correction Factor	= Antenna Factor (14.4 dB/m) + Cable Loss (1.8 dB) - Amp. Gain (28.4 dB)
	= -12.2 dB
Total	= 24.5 dBμV/m
Margin	= 30.0 dBμV/m – 24.5 dBμV/m
	= 5.5 dB

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