NCC RADIO TEST REPORT

Equipment	:	**Wireless Earphone Charging case**
Brand Name	:	**G**
Model Name	:	**G1013**
Applicant	:	**Google LLC** **1600 Amphitheatre Parkway,** **Mountain View, California, 94043 USA**
Standard	:	**NCC LP0002 (2018-01-10)**

The product was received on Mar. 04, 2019 and testing was started from Aug. 27, 2019 and completed on Sep. 02, 2019. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures NCC LP0002 (2018-01-10) and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Jones Tsai

Approved by: Jones Tsai

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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Annex A. Receiver Radiated Emission

History of this test report

Report No.	Version	Description	Issued Date
TR921201-07	01	Initial issue of report	Dec. 24, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	LP0002 3.10.1.6 (2)(A)	20dB Bandwidth	Not Required	-
-	-	99% Occupied Bandwidth	Not Required	-
3.1	LP0002 2.3	AC Conducted Emission	Pass	Under limit 17.27 dB at 0.186 MHz
3.2	LP0002 2.2 3.10.1.3 3.10.1.4	Antenna Requirement	Pass	-
Annex A	LP0002 2.11	Receiver Radiated Emission	Pass	Please refer to Annex A

Remark: Not required means after assessing, test items are not necessary to carry out.

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Yvonne Cheng

1 General Description

1.1. Product Feature of Equipment Under Test

Product Feature	
Equipment	Wireless Earphone Charging case
Brand Name	G
Model Name	G1013
EUT supports Radios application	WPC
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories				
Type A to C Cable	**Brand Name**	Google	**Part Number**	ABA-USB-702-P08
Wireless Earphone	**Brand Name**	G	**Model Name**	G1007
Wireless Earphone	**Brand Name**	G	**Model Number**	G1008

1.2. Product Specification of Equipment Under Test

Standards-related Product Specification	
Rx Frequency	WPC: 110 ~ 205 kHz
Antenna Type	WPC: Coil Antenna type
Type of Modulation	WPC: load

Remark: This device support WPC Rx only by manufacturer.

1.3. Modification of EUT

No modifications are made to the EUT during all test items.

1.4. Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW0007

1.5. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- NCC LP0002 (2018-01-10)
- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

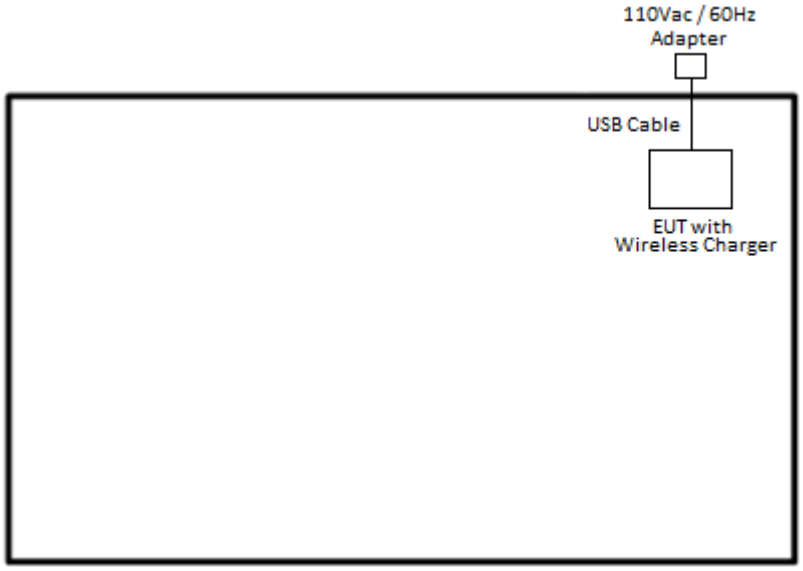
b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
AC Conducted Emission	Mode 1: EUT with Wireless Charger + USB Cable (Charging from Adapter)

2.2 Connection Diagram of Test System

<AC Conducted Emission Mode>



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Wireless Charger	Samsung	EP-PG9201	N/A	N/A	N/A
2.	USB Cable	Samsung	ECB-DU4EBEGSTD	N/A	N/A	Unshielded, 1.5 m
3.	Adapter	Samsung	EP-TA200	N/A	N/A	N/A

Remark: Wireless Charger, USB Cable and Adapter are provided by lab for testing, these accessories would not be attached with the product on the market.

3 Test Result

3.1 AC Conducted Emission Measurement

3.1.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	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.

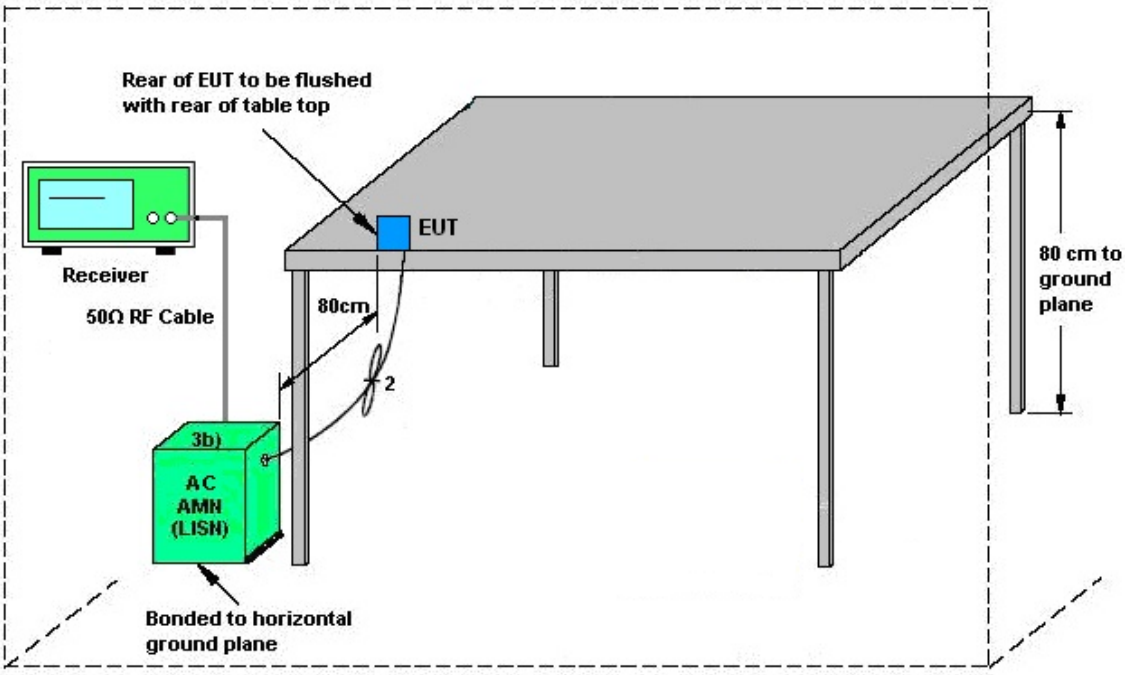
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.1.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

3.2 Antenna Requirements

3.2.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the LP0002 Section 2.2, Section 3.10.1.3, and Section 3.10.1.4.

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.2.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Sep. 02, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 12, 2018	Sep. 02, 2019	Nov. 11, 2019	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Mar. 19, 2019	Sep. 02, 2019	Mar. 18, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Sep. 02, 2019	Nov. 13, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Sep. 02, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Sep. 02, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Sep. 02, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Aug. 27, 2019	N/A	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 04, 2018	Aug. 27, 2019	Dec. 03, 2019	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D&N -6-06	35414&AT-N 0602	30MHz~1GHz	Oct. 13, 2018	Aug. 27, 2019	Oct. 12, 2019	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	Aug. 27, 2019	Jan. 06, 2020	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHz	Oct. 19, 2018	Aug. 27, 2019	Oct. 18, 2019	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 27, 2019	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Aug. 27, 2019	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Aug. 27, 2019	N/A	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY55420170	20MHz~8.4GHz	Mar. 08, 2019	Aug. 27, 2019	Mar. 07, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WHK20/1000C 7/40SS	SN2	20M High Pass	Sep. 16, 2018	Aug. 27, 2019	Sep. 15, 2019	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz-30MHz	Mar. 14, 2018	Aug. 27, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	30M-18G	Mar. 14, 2018	Aug. 27, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 14, 2018	Aug. 27, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP161237	N/A	Oct. 22, 2018	Aug. 27, 2019	Oct. 21, 2019	Radiation (03CH11-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.20**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.20**

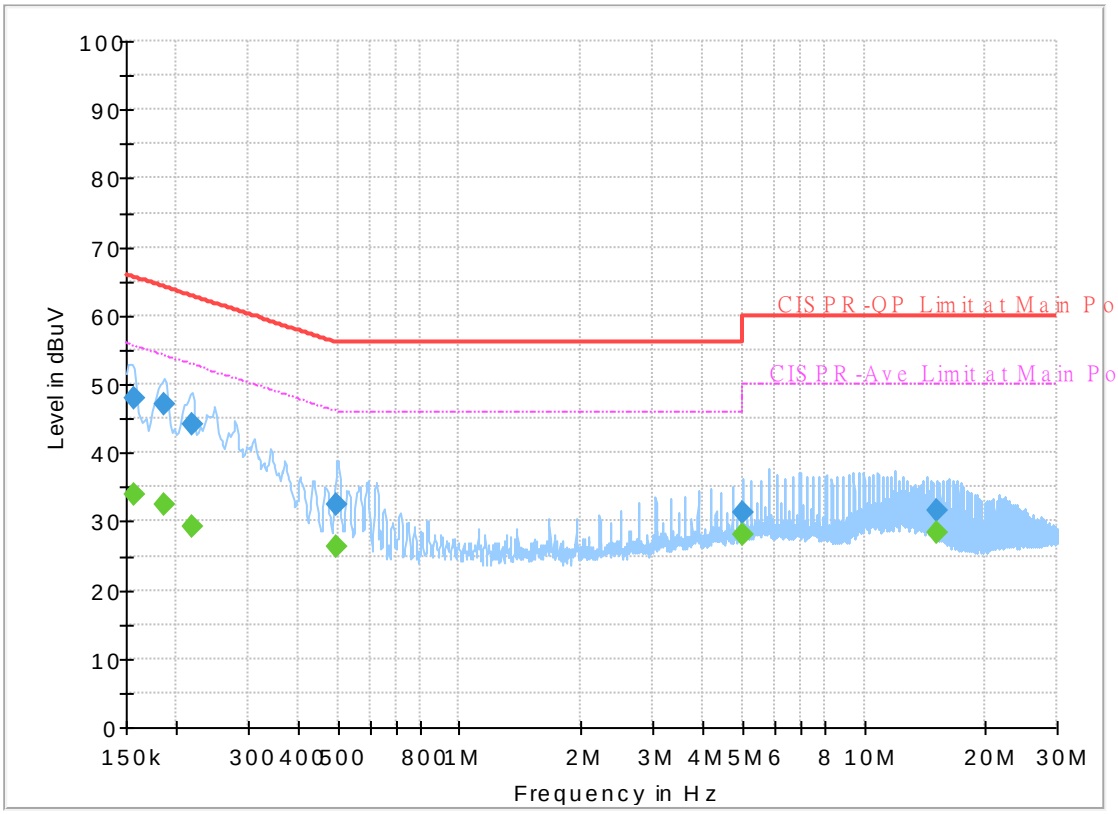
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Jimmy Chang	**Temperature :**	24~25.8℃
		Relative Humidity :	47.6~50%

EUT Information

Report NO :	921201-07
Test Mode :	Mode 1
Test Voltage :	110Vac/60Hz
Phase :	Line

Full Spectrum



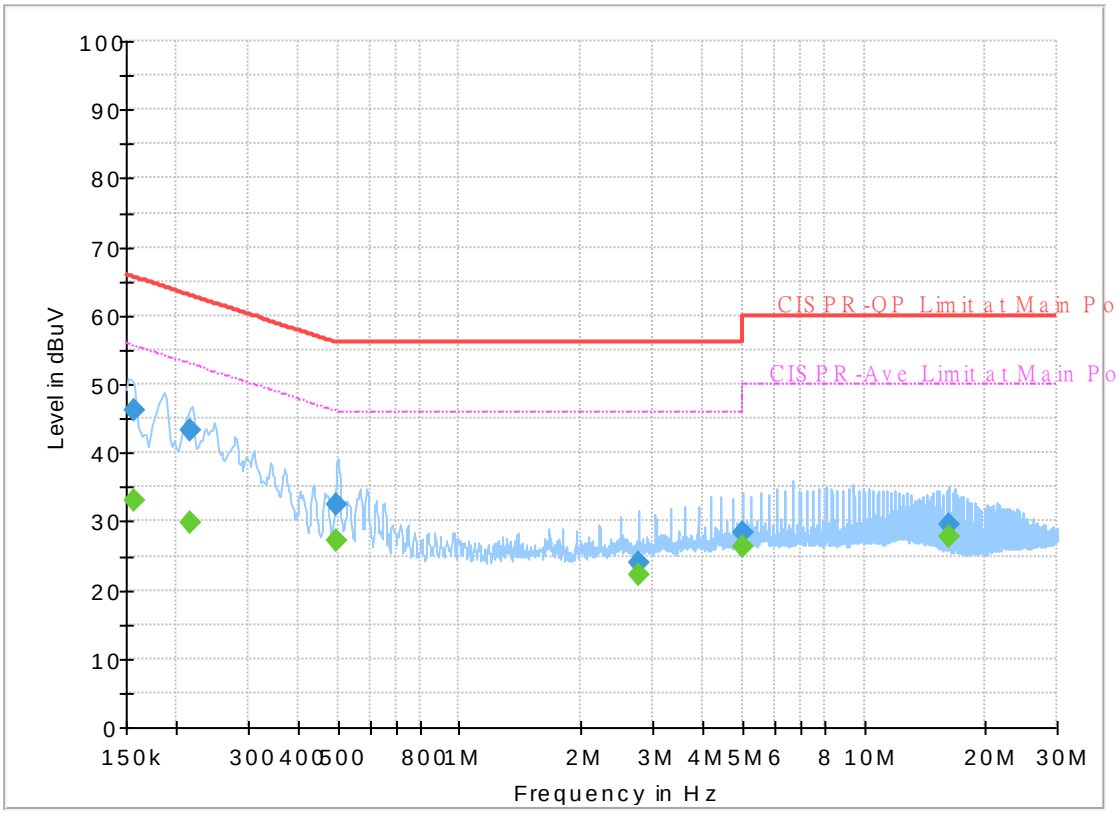
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	33.78	55.63	21.85	L1	OFF	19.5
0.156750	47.92	---	65.63	17.71	L1	OFF	19.5
0.186000	---	32.58	54.21	21.63	L1	OFF	19.5
0.186000	46.94	---	64.21	17.27	L1	OFF	19.5
0.217500	---	29.33	52.91	23.58	L1	OFF	19.5
0.217500	44.07	---	62.91	18.84	L1	OFF	19.5
0.498750	---	26.20	46.02	19.82	L1	OFF	19.5
0.498750	32.54	---	56.02	23.48	L1	OFF	19.5
4.994250	---	28.06	46.00	17.94	L1	OFF	19.6
4.994250	31.38	---	56.00	24.62	L1	OFF	19.6
15.121500	---	28.46	50.00	21.54	L1	OFF	20.0
15.121500	31.43	---	60.00	28.57	L1	OFF	20.0

EUT Information

Report NO :	921201-07
Test Mode :	Mode 1
Test Voltage :	110Vac/60Hz
Phase :	Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	32.92	55.63	22.71	N	OFF	19.5
0.156750	46.16	---	65.63	19.47	N	OFF	19.5
0.215250	---	29.86	53.00	23.14	N	OFF	19.5
0.215250	43.23	---	63.00	19.77	N	OFF	19.5
0.498750	---	27.30	46.02	18.72	N	OFF	19.5
0.498750	32.45	---	56.02	23.57	N	OFF	19.5
2.773500	---	22.15	46.00	23.85	N	OFF	19.6
2.773500	24.12	---	56.00	31.88	N	OFF	19.6
4.994250	---	26.33	46.00	19.67	N	OFF	19.7
4.994250	28.26	---	56.00	27.74	N	OFF	19.7
16.230750	---	27.76	50.00	22.24	N	OFF	20.1
16.230750	29.64	---	60.00	30.36	N	OFF	20.1

Annex. A Receiver Radiated Emission Measurement

A.1 Limit of Receiver Radiated Emission

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

A.2 Measuring Instruments

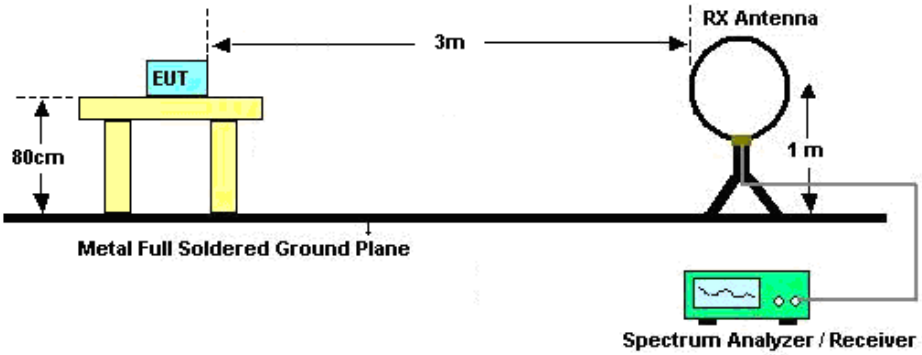
See list of measuring equipment of this test report.

A.3 Test Procedures

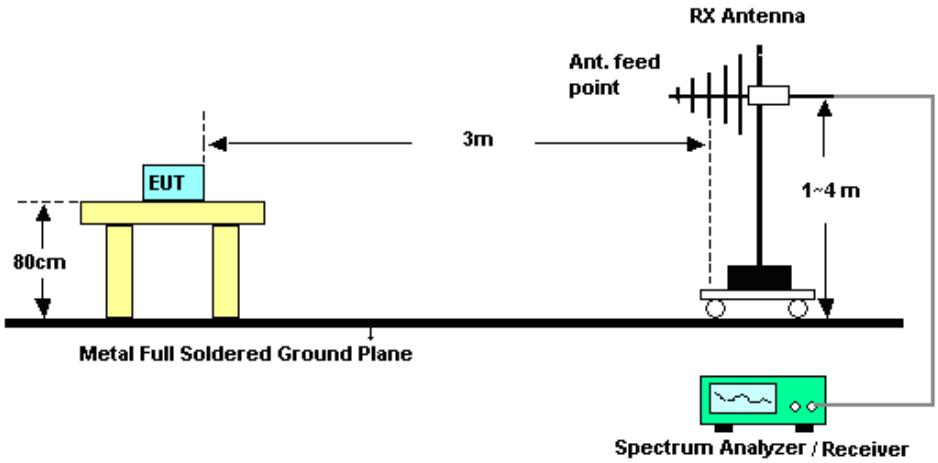
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

A.4 Test Setup

For radiated emissions below 30MHz



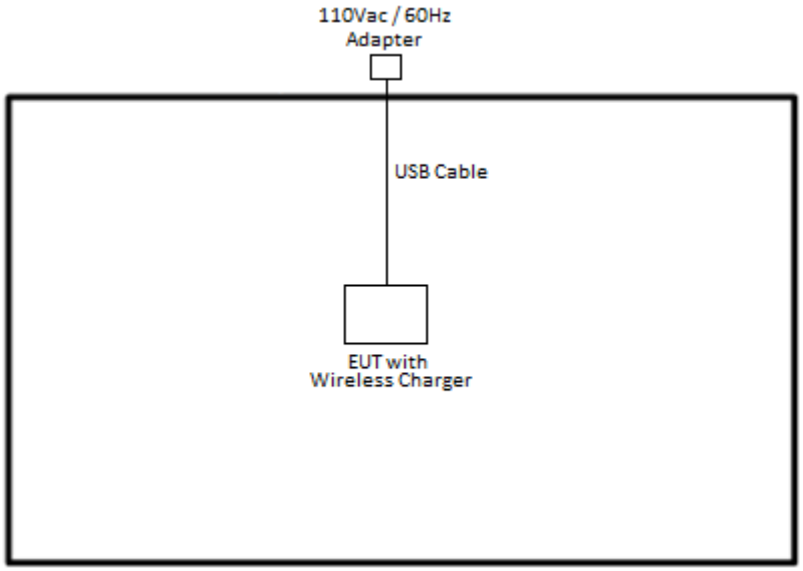
For radiated emissions from 30MHz to 1GHz



A.5 Test Result of Receiver Radiated Spurious Emissions (9kHz ~ 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

A.6 Connection Diagram of Test System



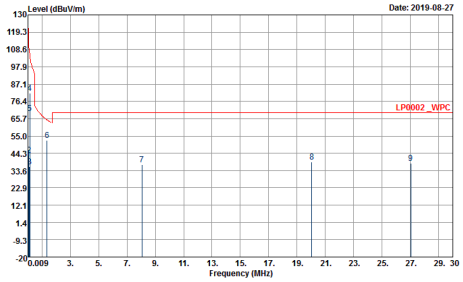
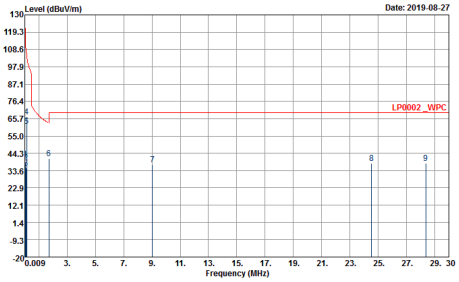
A.7 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Wireless Charger	Samsung	EP-PG9201	N/A	N/A	N/A
2.	USB Cable	N/A	N/A	N/A	N/A	Unshielded, 1.5 m
3.	Adapter	N/A	N/A	N/A	N/A	N/A

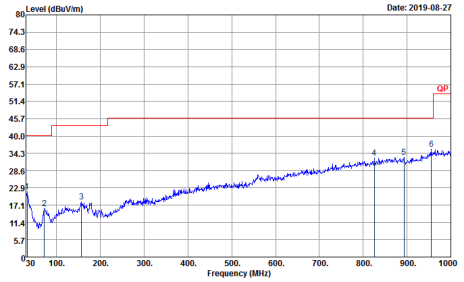
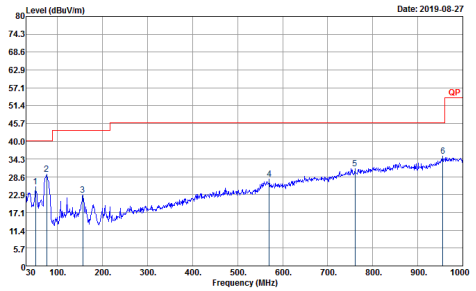
A.8 Test Result of Receiver Radiated Spurious Emission (30MHz ~ 5th Harmonic)

Test Engineer :	Fu Chen	**Temperature :**	23.1~24.6°C
		Relative Humidity :	55.5~60.5%
Frequency	995.380 MHz	**Margin**	Under 10.27 dB
Test Mode	EUT with Wireless Charger Rx Mode + USB Cable (Charging from Adapter)		

<For 9 kHz ~ 30 MHz>

	Idle Mode	
	Horizontal	**Vertical**
QP **Avg.**	 Site : 03CH11-HY Condition : LP0002_WPC 3m LOOP_ANT(H) HORIZONTAL Project : 921201-07 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB cm deg 1 0.02 40.91 -81.01 121.92 21.12 19.78 0.01 --- --- Average 2 0.07 43.12 -67.69 110.81 23.89 19.22 0.01 --- --- Average 3 0.11 35.80 -71.23 107.03 16.70 19.09 0.01 --- --- QP 4 0.14 81.45 -23.21 104.66 62.38 19.06 0.01 --- --- Average 5 0.15 68.80 -35.28 104.08 49.74 19.05 0.01 --- --- Average 6 1.36 52.24 -12.69 64.93 32.93 19.30 0.01 100 0 QP 7 8.06 37.40 -32.10 69.50 16.89 20.39 0.12 --- --- QP 8 20.05 39.03 -30.47 69.50 17.16 21.70 0.17 --- --- QP 9 27.04 38.24 -31.26 69.50 16.28 21.77 0.19 --- --- QP	 Site : 03CH11-HY Condition : LP0002_WPC 3m LOOP_ANT(V) VERTICAL Project : 921201-07 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB cm deg 1 0.02 40.53 -81.39 121.92 20.74 19.78 0.01 --- --- Average 2 0.06 38.35 -73.33 111.68 19.09 19.25 0.01 --- --- Average 3 0.09 35.17 -72.99 108.16 16.04 19.12 0.01 --- --- QP 4 0.14 66.91 -37.59 104.50 47.84 19.06 0.01 --- --- Average 5 0.15 61.11 -42.97 104.08 42.05 19.05 0.01 --- --- Average 6 1.71 41.10 -21.87 62.97 21.79 19.30 0.01 100 0 QP 7 9.02 37.22 -32.28 69.50 16.44 20.65 0.13 --- --- QP 8 24.53 38.27 -31.23 69.50 16.33 21.75 0.19 --- --- QP 9 28.36 38.05 -31.45 69.50 16.07 21.78 0.20 --- --- QP

<For 30 MHz ~ 1 GHz>

	Idle Mode	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH11-HY Condition : QP 3m BI-LOG 6111D-LF_ETC HORIZONTAL Project : 921201-07 Freq / Level / Over Limit / Limit Line / ReadAntenna Level / Cable Loss / Preamp Factor / A/Pos / T/Pos / Remark MHz / dBuV/m / dB / dBuV/m / dBuV / dB/m / dB / dB / cm / deg 1 32.91 21.66 -18.34 40.00 30.36 22.73 0.79 32.37 --- --- Peak 2 71.71 15.98 -24.02 40.00 34.92 12.19 1.11 32.35 --- --- Peak 3 157.07 18.23 -25.27 43.50 32.25 16.50 1.65 32.27 --- --- Peak 4 825.40 32.69 -13.31 46.00 30.95 28.26 3.84 31.75 --- --- Peak 5 893.30 32.92 -13.08 46.00 30.29 29.02 4.00 31.39 --- --- Peak 6 955.38 35.73 -10.27 46.00 30.40 30.81 4.13 30.84 100 0 Peak	 Site : 03CH11-HY Condition : QP 3m BI-LOG 6111D-LF_ETC VERTICAL Project : 921201-07 Freq / Level / Over Limit / Limit Line / ReadAntenna Level / Cable Loss / Preamp Factor / A/Pos / T/Pos / Remark MHz / dBuV/m / dB / dBuV/m / dBuV / dB/m / dB / dB / cm / deg 1 51.34 25.32 -14.68 40.00 43.15 13.53 0.94 32.37 --- --- Peak 2 75.59 29.52 -10.48 40.00 47.99 12.61 1.14 32.34 100 0 Peak 3 156.10 22.63 -20.87 43.50 36.63 16.54 1.64 32.28 --- --- Peak 4 570.29 27.95 -18.05 46.00 30.79 25.83 3.16 32.20 --- --- Peak 5 760.41 31.23 -14.77 46.00 30.73 27.89 3.70 31.98 --- --- Peak 6 955.38 35.25 -10.75 46.00 29.92 30.81 4.13 30.84 --- --- Peak

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