RF MEASUREMENT REPORT

FCC ID:	2ALS8-SS0004
Applicant:	Ninebot (Changzhou) Tech Co., Ltd.
Product:	ninebot smart dashboard
Model No.:	WF-100
Brand Name:	ninebot
FCC Classification:	Part 15 Low Power Transmitter Below 1705 kHz (DCD)
FCC Rule Part(s):	Part15 Subpart C (Section 15.209)
Result:	Complies
Test Date:	2022-10-28 ~ 2022-10-30

Reviewed By: Vincent Yu

Approved By: Robin Wu

Revision History

Report No.	Version	Description	Issue Date	Note
2210RSU031-U2	Rev. 01	Initial Report	2022-12-08	Valid

CONTENTS

1. General Information

1.1. Applicant

Ninebot (Changzhou) Tech Co., Ltd.

16F-17F, Block A, Building 3, Changwu Mid Road 18#, Wujin Dist., Changzhou, Jiangsu, China

1.2. Manufacturer

Ninebot (Changzhou) Tech Co., Ltd.

16F-17F, Block A, Building 3, Changwu Mid Road 18#, Wujin Dist., Changzhou, Jiangsu, China

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China **Laboratory Location (Suzhou - SIP)** 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	ninebot smart dashboard
Model No.	WF-100
EUT Identification No.	20221021Sample#05
NFC Specification	13.56MHz
WPT Specification	115 ~ 135kHz
Power Supply	18VDC / 1.5A
Output	15W (Max)
Operating Temp.	0 ~ 40°C
Note: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification under Test

WPT Specification	115 ~ 135kHz
Modulation	ASK
Antenna Type	Coil Antenna

2. Test Configuration

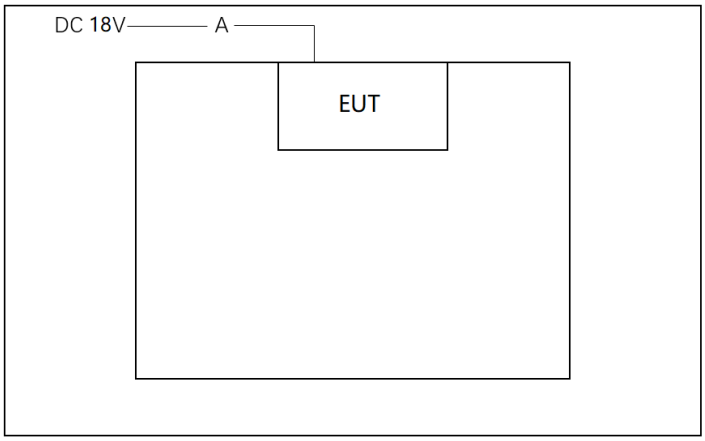
2.1. Test Mode

Mode 1: Standby Mode
Mode 2: Charge the Load
Mode 3: Charge the iPhone

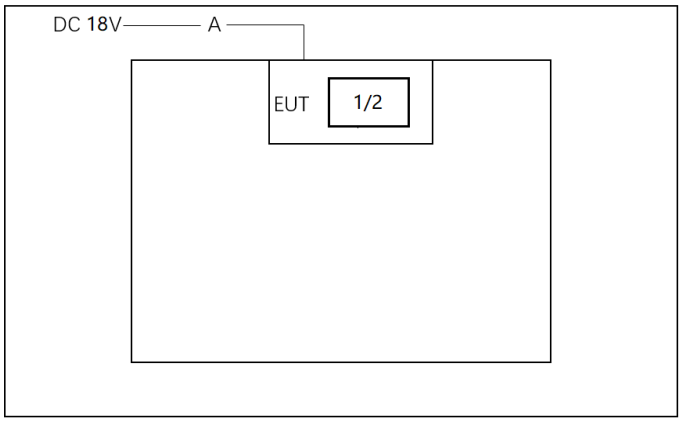
2.2. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

Mode 1



Mode 2 & Mode 3



Cable Type		Cable Spec.	Length
A	Power Cable	Non-Shielded	>10.0m
Product		**Manufacturer**	**Model No.**
1	Charging Load	EESON	N/A
2	iPhone	Apple	iPhone XR

2.3. Applied Standards

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

- FCC Part 15.209
- ANSI C63.10-2013

2.4. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~ 75%RH

3. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. 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 provisions of this section."

- The antenna of the device is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument Name	Manufacturer	Model No.	Asset No.	Cali. Interval	Cal. Due Date	Test Site
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2023/06/01	SIP-AC3
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2023/06/01	SIP-AC3
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2023/03/14	SIP-AC3
TRILOG Antenna	Schwarzbeck	VULB9168	MRTSUE06646	1 year	2023/08/16	SIP-AC3
Thermal Hygrometer	testo	608-H1	MRTSUE06619	1 year	2023/11/01	SIP-AC3
Thermal Hygrometer	testo	608-H1	MRTSUE06622	1 year	2022/11/28	SIP-AC3
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2022/12/23	SIP-AC3

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & Turntable

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~200MHz: 3.85dB 200MHz~1GHz: 4.36dB 1GHz~6GHz: 4.98dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.28dB 1GHz~6GHz: 4.91dB

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.215 (c)	20dB Bandwidth	Radiated	Pass
15.209	General Field Strength Limits		Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	N/A

Note:

1. For radiated emission tests, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
2. “N/A” means not applicable.

6.2. 20dB Bandwidth Measurement

6.2.1. Test Limit

N/A

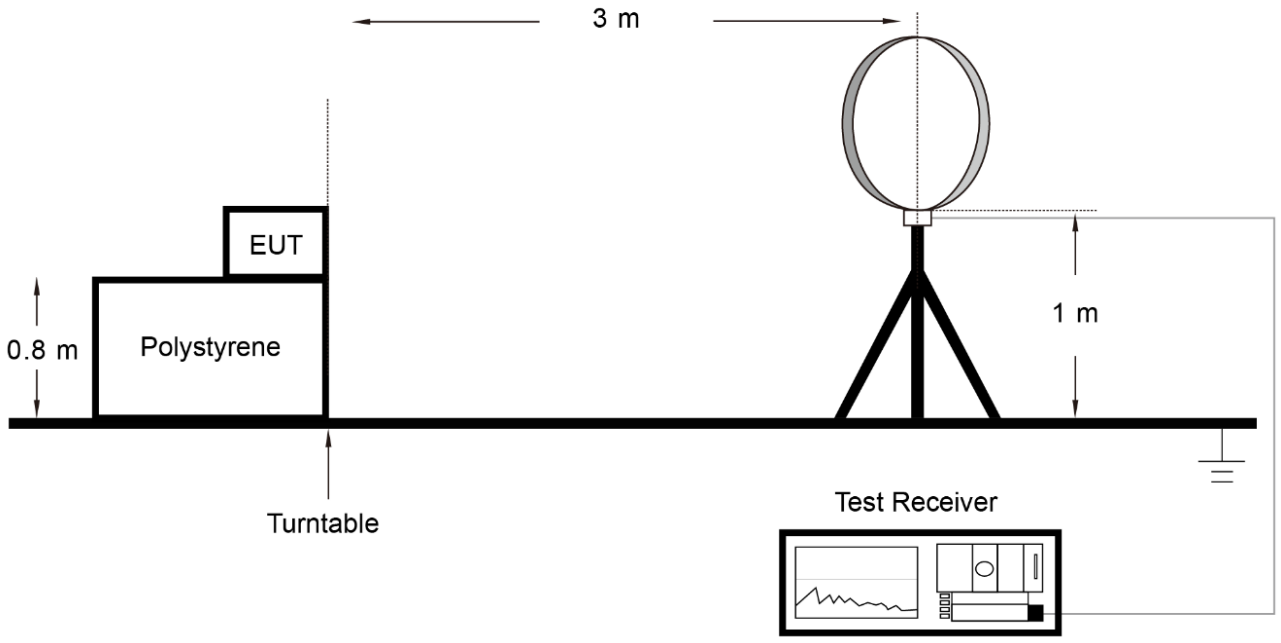
6.2.2. Test Procedure

ANSI C63.10:2013 Clause 6.9.2

6.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 20dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 20. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. The span range shall be between two times and five times the OBW
3. Set RBW = 1% ~ 5% of the OBW
4. VBW ≥ 3 × RBW
5. Detector = Peak
6. Trace mode = max hold
7. Sweep = auto couple
8. Allow the trace to stabilize.

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.1.

6.3. General Field Strength Measurement

6.3.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.3.2. Test Procedure

ANSI C63.10 - 2013 - Section 6.3 (General Requirements)

ANSI C63.10 - 2013 - Section 6.4 (Standard test method below 30MHz)

6.3.3. Test Setting

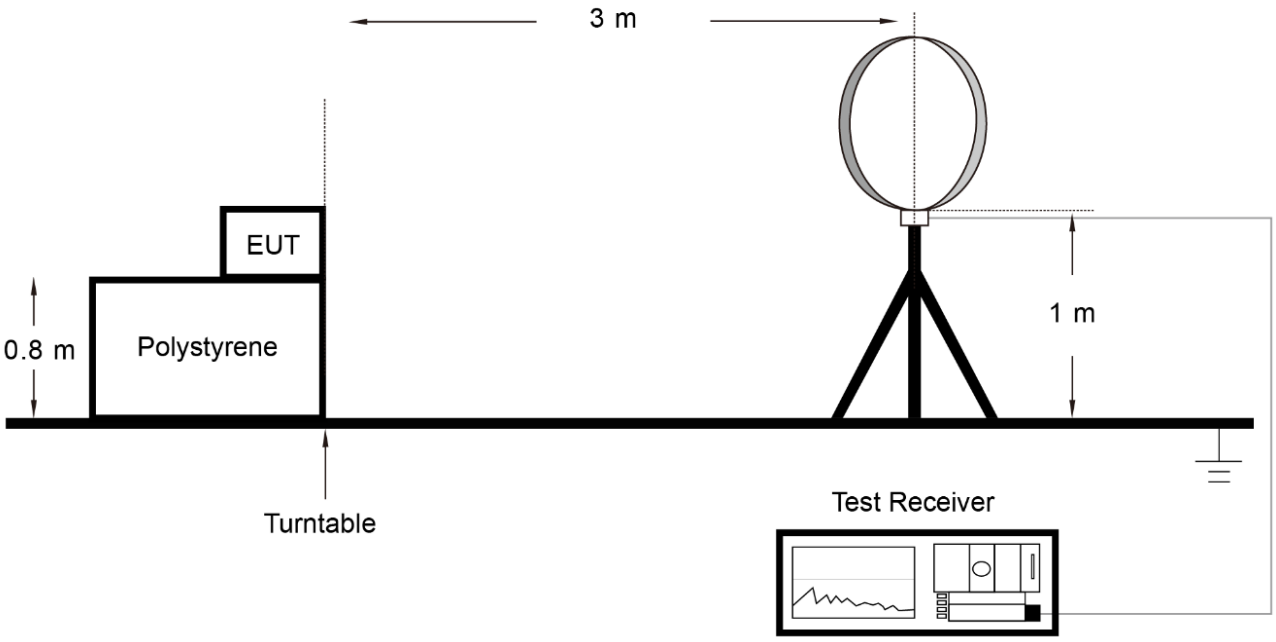
Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz

Peak Measurements below 30MHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = Peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

6.3.4. Test Setup



6.3.5. Test Result

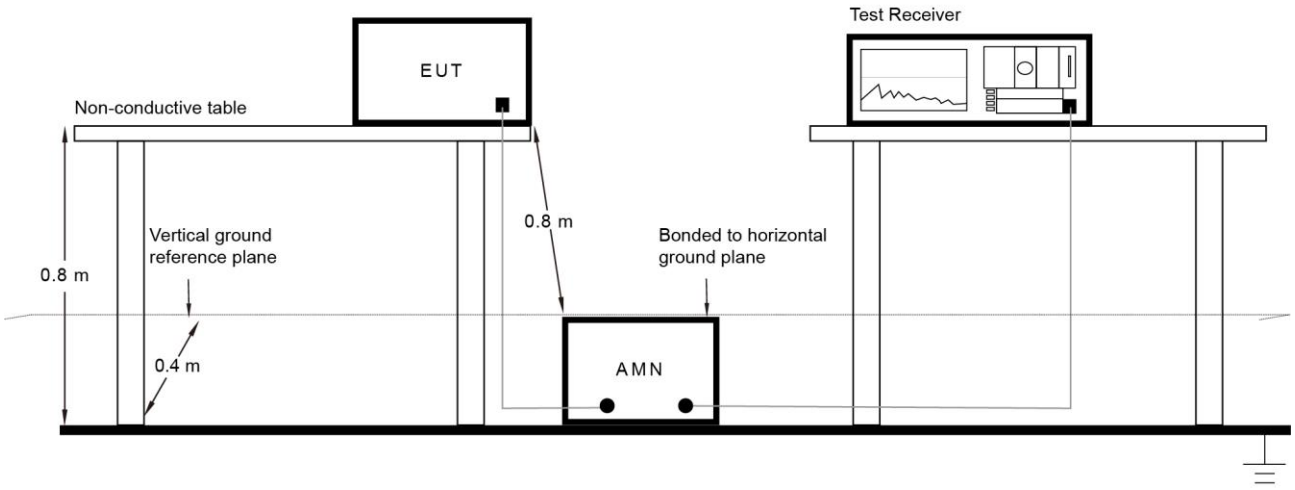
Refer to Appendix A.2.

6.4. AC Conducted Emissions Measurement

6.4.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.		

6.4.2. Test Setup



6.4.3. Test Result

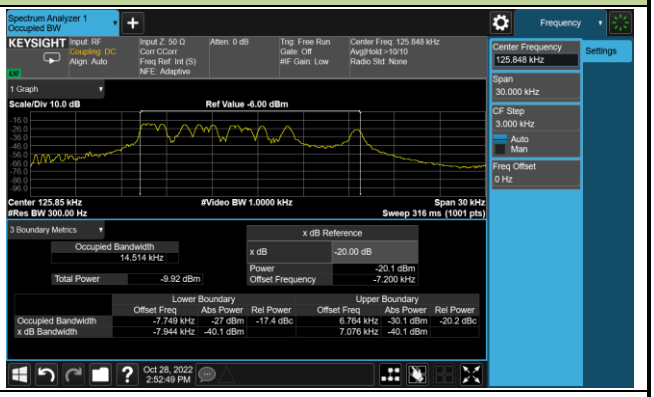
Refer to Appendix A.3.

Appendix A - Test Result

A.1 20dB Bandwidth Test Result

Test Site	SIP-AC3	Test Engineer	Simon Lu
Test Date	2022-10-28		

Test Mode	20dB Bandwidth (Hz)
Mode 1	63
Mode 2	15020
Mode 3	25

20dB Bandwidth	
Mode 1	Mode 2
	
Mode 3	
	

A.2 General Field Strength Test Result

Test Site	SIP-AC3	Test Engineer	Simon Lu
Test Date	2022-10-30	Test Mode	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level@3m (dBμV/m)	Final Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
Fundamental Radiated Emission							
0.128	72.009	18.770	90.779	10.779	25.5	-14.721	Coaxial
0.128	68.254	18.770	87.024	7.024	25.5	-18.476	Coplanar
Radiated Spurious Emission							
0.065	24.008	18.718	42.726	-37.274	31.3	-68.574	Coaxial
0.101	41.298	18.729	60.026	-19.974	27.5	-47.474	Coaxial
0.628	40.596	18.757	59.353	19.353	31.6	-12.247	Coaxial
0.881	32.951	18.965	51.916	11.916	28.7	-16.784	Coaxial
1.911	21.571	19.002	40.573	0.573	29.5	-28.927	Coaxial
0.078	22.346	18.709	41.055	-38.945	29.8	-68.745	Coplanar
0.101	36.298	18.729	55.026	-24.974	27.5	-52.474	Coplanar
0.628	36.463	18.757	55.220	15.220	31.6	-16.38	Coplanar
0.896	29.426	18.967	48.393	8.393	28.6	-20.207	Coplanar
21.329	22.002	18.728	40.730	0.73	29.5	-28.77	Coplanar

Note:

1. Measure Level@3m (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)
   Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
2. **For the frequency within 0.009MHz ~ 0.49MHz, D = 300m:**
   Final Measure Level = Measure Level@3m – 40*log (D/3)
   For the frequency within 0.49MHz ~ 30MHz, D = 30m:
   Final Measure Level = Measure Level@3m – 40*log (D/3)
3. All measurements were recorded using an EMI test receiver employing a peak detector.

Test Site	SIP-AC3	Test Engineer	Simon Lu
Test Date	2022-10-30	Test Mode	Mode 2

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level@3m (dBμV/m)	Final Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
Fundamental Radiated Emission							
0.128	70.482	18.770	89.252	9.252	25.5	-16.248	Coaxial
0.128	66.527	18.770	85.297	5.297	25.5	-20.203	Coplanar
Radiated Spurious Emission							
0.041	26.590	18.815	45.405	-34.595	35.3	-69.895	Coaxial
0.078	21.787	18.709	40.496	-39.504	29.8	-69.304	Coaxial
0.508	36.534	19.038	55.572	15.572	33.5	-17.928	Coaxial
0.628	34.641	18.757	53.398	13.398	31.6	-18.202	Coaxial
0.896	29.428	18.967	48.395	8.395	28.6	-20.205	Coaxial
0.061	22.720	18.734	41.454	-38.546	31.9	-70.446	Coplanar
0.078	21.759	18.709	40.468	-39.532	29.8	-69.332	Coplanar
0.628	31.685	18.757	50.442	10.442	31.6	-21.158	Coplanar
0.896	26.022	18.967	44.989	4.989	28.6	-23.611	Coplanar
21.329	22.500	18.728	41.228	1.228	29.5	-28.272	Coplanar

Note:

1. Measure Level@3m (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

   Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)

2. **For the frequency within 0.009MHz ~ 0.49MHz, D = 300m:**

   Final Measure Level = Measure Level@3m – 40*log (D/3)

   For the frequency within 0.49MHz ~ 30MHz, D = 30m:

   Final Measure Level = Measure Level@3m – 40*log (D/3)

3. All measurements were recorded using an EMI test receiver employing a peak detector.

Test Site	SIP-AC3	Test Engineer	Simon Lu
Test Date	2022-10-30	Test Mode	Mode 3

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level@3m (dBμV/m)	Final Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
Fundamental Radiated Emission							
0.128	55.501	18.770	74.271	-5.729	25.5	-31.229	Coaxial
0.128	51.562	18.770	70.332	-9.668	25.5	-35.168	Coplanar
Radiated Spurious Emission							
0.022	33.386	19.498	52.884	-27.116	40.8	-67.916	Coaxial
0.038	26.976	18.862	45.838	-34.162	36.0	-70.162	Coaxial
0.078	22.114	18.709	40.823	-39.177	29.8	-68.977	Coaxial
0.643	30.247	18.672	48.919	8.919	31.4	-22.481	Coaxial
0.896	26.725	18.967	45.692	5.692	28.6	-22.908	Coaxial
21.344	9.004	18.731	27.735	-12.265	29.5	-41.765	Coaxial
0.046	25.495	18.795	44.290	-35.710	34.3	-70.010	Coplanar
0.078	22.058	18.709	40.767	-39.233	29.8	-69.033	Coplanar
0.107	17.365	18.737	36.102	-43.898	27.0	-70.898	Coplanar
0.896	23.221	18.967	42.188	2.188	28.6	-26.412	Coplanar
3.195	13.045	19.047	32.092	-7.908	29.5	-37.408	Coplanar
22.672	16.059	18.747	34.806	-5.194	29.5	-34.694	Coplanar

Note:

1. Measure Level@3m (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)
   Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
2. **For the frequency within 0.009MHz ~ 0.49MHz, D = 300m:**
   Final Measure Level = Measure Level@3m – 40*log (D/3)
   For the frequency within 0.49MHz ~ 30MHz, D = 30m:
   Final Measure Level = Measure Level@3m – 40*log (D/3)
3. All measurements were recorded using an EMI test receiver employing a peak detector.

A.3 AC Conducted Emissions Test Result

This device is powered by external DC source, so the item is not applicable.

Appendix B - Test Setup Photograph

Refer to “2210RSU031-UT” file.

Appendix C - EUT Photograph

Refer to “2210RSU031-UE” file.

The End