



RF MEASUREMENT REPORT

FCC ID: 2ATJC-FM29000

Applicant: Aptiv Electrical Centers (Shanghai) Co.,Ltd

Product: Wireless Charger

Model No.: 15W Wireless Charger

FCC Classification: Part 15 Low Power Transmitter Below 1705 kHz (DCD)

FCC Rule Part(s): Part15 Subpart C (Section 15.209)

Result: Complies

Received Date: 2022-11-09

Test Date: 2022-11-17 ~ 2022-11-23

Reviewed By:

Vincent Yu

Vincent Yu

Approved By:

Robin Wu

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2211RSU024-U1	V01	Initial Report	2023-03-14	Invalid

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1. General Information

1.1. Applicant

Aptiv Electrical Centers (Shanghai) Co.,Ltd

Zone A, Building 7, No.60, Yuanguo Road, Anting Town, Jiading District, Shanghai, China

1.2. Manufacturer

Aptiv Electrical Centers (Shanghai) Co.,Ltd

Zone A, Building 7, No.60, Yuanguo Road, Anting Town, Jiading District, Shanghai, 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	Wireless Charger
Model No.	15W Wireless Charger
Operating Temp.	-40~80°C
Input Voltage	DC 12V
Output	15W (MAX)
EUT Identification	20221109Sample#09
WPT Specification	
Standby Frequency	127.7kHz
Standby Secondary Frequency	120kHz
Charging Frequency	127.7kHz
Notes:	
1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. 2. Standby mode has two different frequencies, and the secondary frequency is for detecting objects on charging pad.	

1.5. Radio Specification under Test

Working Frequency	120kHz, 127.7kHz
Modulation Type	FSK
Antenna Type	Coil Antenna

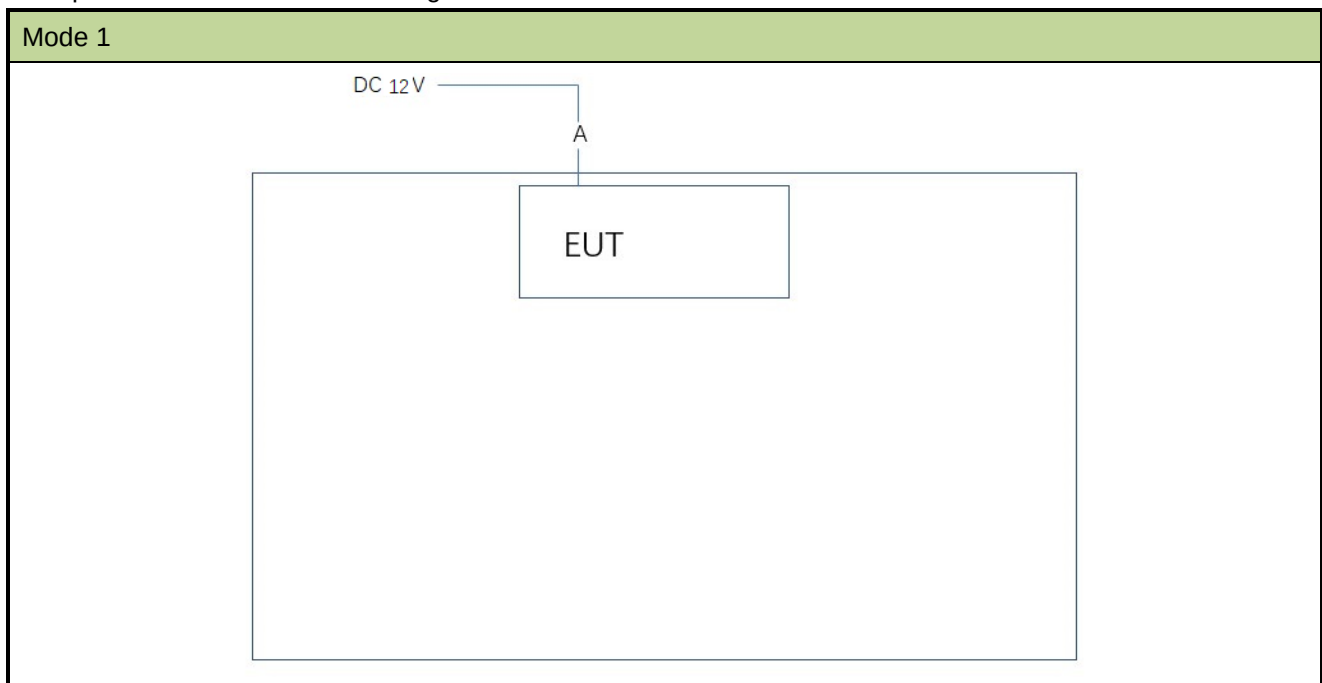
2. Test Configuration

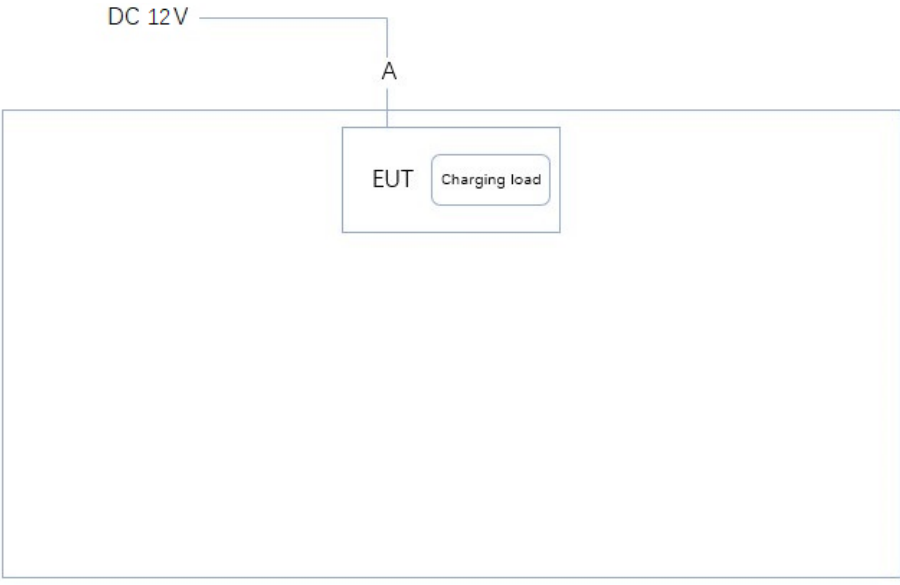
2.1. Test Mode

Mode 1: Standby Mode
Mode 2: Charge the Load

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.



Mode 2			
			
No.	Cable Type	Cable Spec.	Length
A	DC Power Cable	Non-Shielded	1.5m
No.	Product	Manufacturer	Model No.
N/A	Charging Load	Aptiv	N/A

Note: The Charging load was provided by manufacturer.

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	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2023-11-01	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2022-11-28	SIP-AC3
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2022-12-23	SIP-AC3
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2023-03-14	SIP-AC3
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2023-06-01	SIP-AC3
Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2022-12-09	SIP-AC3

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

5. Test Result

5.1. 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.

Note 2: N/A means not applicable and details refer to the relevant sections.

5.2. 20dB Bandwidth Measurement

5.2.1. Test Limit

N/A

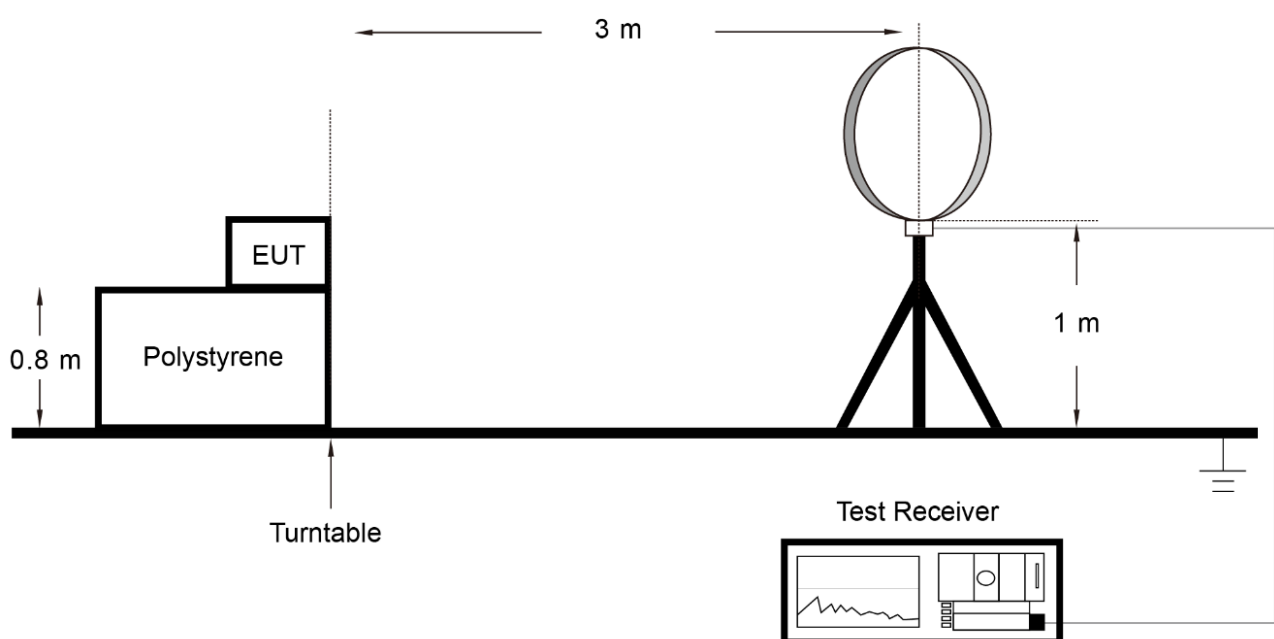
5.2.2. Test Procedure

ANSI C63.10:2013 Clause 6.9.2

5.2.3. 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. $VBW \geq 3 \times RBW$
5. Detector = Peak
6. Trace mode = max hold
7. Sweep = auto couple
8. Allow the trace to stabilize.

5.2.4. Test Setup



5.2.5. Test Result

Refer to Appendix A.1.

5.3. General Field Strength Measurement

5.3.1. 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 [$\mu\text{V/m}$]	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

5.3.2. Test Procedure

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

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

5.3.3. 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

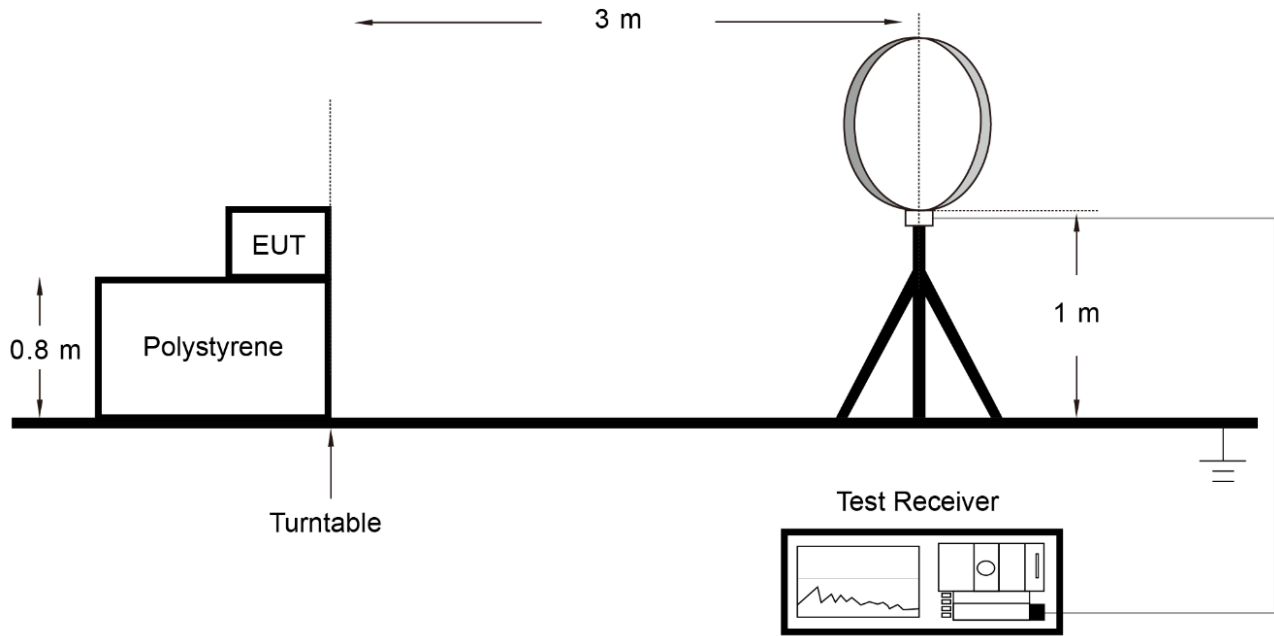
Quasi-Peak Measurements below 1GHz

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 = CISPR quasi-peak (except frequency bands 9~90 kHz and 110~490kHz, in these two bands employ an average detector)
5. Sweep time = auto couple

6. Trace was allowed to stabilize

5.3.4. Test Setup

Below 30MHz Test Setup:



5.3.5. Test Result

Refer to Appendix A.2.

5.4. AC Conducted Emissions Measurement

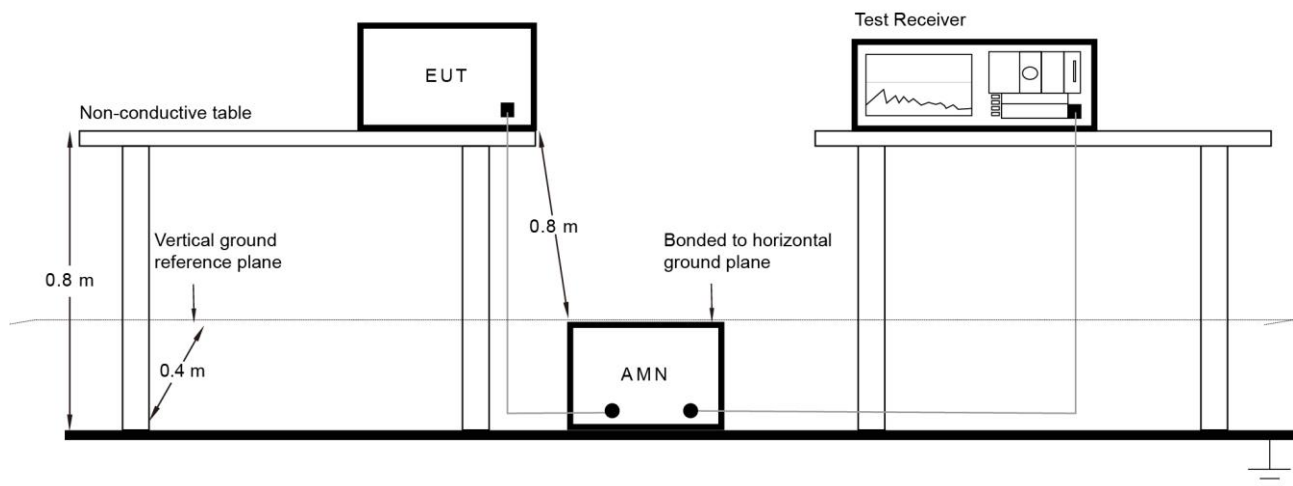
5.4.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dB μ V)	AV (dB μ V)
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.

5.4.2. Test Setup



5.4.3. Test Result

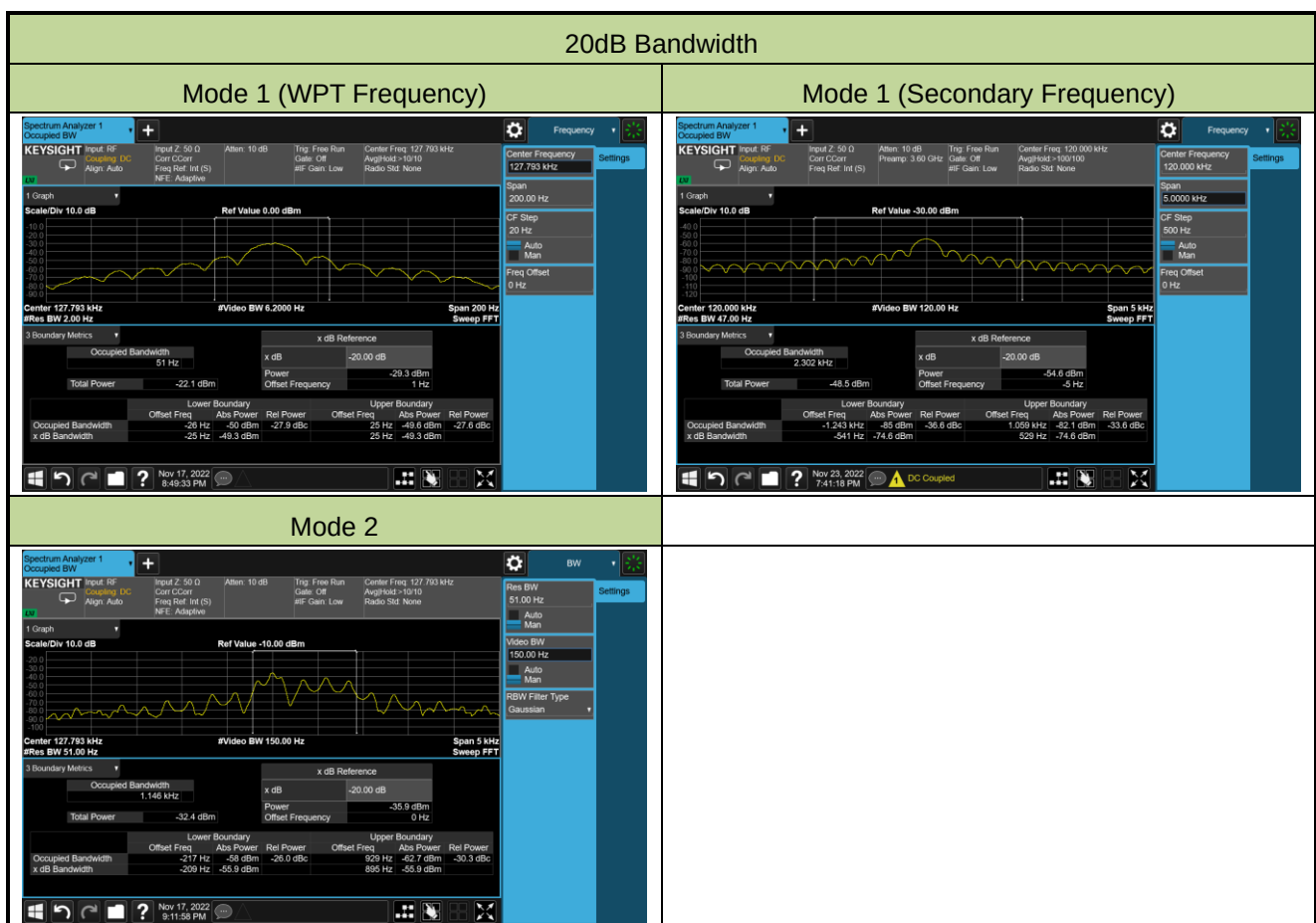
The EUT is installed in vehicle and powered by battery, so the requirement is not applicable.

Appendix A - Test Result

A.1 20dB Bandwidth Test Result

Test Site	SIP-AC3	Test Engineer	Arvin Ding
Test Date	2022-11-17 ~ 2022-11-23		

Test Mode	20dB Bandwidth (Hz)
Mode 1 (Standby Frequency)	50
Mode 1 (Standby Secondary Frequency)	1070
Mode 2	1104



A.2 General Field Strength Test Result

Test Site	SIP-AC3	Test Engineer	Arvin Ding
Test Date	2022-11-17	Test Mode	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level@3m (dBμV/m)	Measure Level@300m or 30m ^{Note 2} (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Standby Frequency Radiated Emission								
0.128	77.296	18.770	96.066	16.066	25.460	-9.394	Peak	Coaxial
0.128	74.062	18.770	92.832	12.832	25.460	-12.628	Peak	Coplanar
Standby Secondary Frequency Radiated Emission								
0.120	57.646	18.757	76.403	-3.597	26.021	-29.618	Peak	Coaxial
0.120	57.662	18.757	76.419	-3.581	26.021	-29.602	Peak	Coplanar
Radiated Spurious Emission								
0.013	35.539	19.856	55.395	-24.605	45.325	-69.930	Peak	Coaxial
0.026	30.482	19.339	49.821	-30.179	39.305	-69.484	Peak	Coaxial
0.047	24.114	18.791	42.905	-37.095	34.162	-71.257	Peak	Coaxial
0.063	23.918	18.726	42.644	-37.356	31.617	-68.973	Peak	Coaxial
0.079	25.588	18.709	44.297	-35.703	29.652	-65.355	Peak	Coaxial
0.100	34.127	18.726	52.853	-27.147	27.604	-54.751	Peak	Coaxial
0.150	56.086	18.732	74.818	-5.182	24.082	-29.264	Peak	Coaxial
0.389	41.454	18.704	60.158	-19.842	15.805	-35.647	Peak	Coaxial
0.643	24.344	18.672	43.016	3.016	31.440	-28.424	Peak	Coaxial
5.016	10.967	19.012	29.979	-10.021	29.542	-39.563	Peak	Coaxial
10.403	9.908	18.870	28.778	-11.222	29.542	-40.764	Peak	Coaxial
23.433	9.293	18.802	28.095	-11.905	29.542	-41.447	Peak	Coaxial
0.010	39.148	19.975	59.123	-20.877	47.604	-68.481	Peak	Coplanar
0.022	31.210	19.498	50.708	-29.292	40.756	-70.048	Peak	Coplanar
0.036	28.640	18.942	47.582	-32.418	36.478	-68.896	Peak	Coplanar
0.047	24.777	18.791	43.568	-36.432	34.162	-70.594	Peak	Coplanar
0.079	25.587	18.709	44.296	-35.704	29.652	-65.356	Peak	Coplanar
0.099	32.050	18.725	50.775	-29.225	27.692	-56.917	Peak	Coplanar
0.150	52.564	18.732	71.296	-8.704	24.082	-32.786	Peak	Coplanar
0.389	37.883	18.704	56.587	-23.413	15.805	-39.218	Peak	Coplanar
0.643	21.590	18.672	40.262	0.262	31.440	-31.178	Peak	Coplanar
5.747	10.492	18.888	29.380	-10.620	29.542	-40.162	Peak	Coplanar

13.284	13.454	18.662	32.116	-7.884	29.542	-37.426	Peak	Coplanar
23.642	9.399	18.835	28.234	-11.766	29.542	-41.308	Peak	Coplanar

Note 1: Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB/m)

Note 2: For frequencies below 0.49MHz, the distance is 300m, otherwise is 30m.

Note 3: Measure Level@300m (dB μ V/m) = Measure Level@3m (dB μ V/m) - 40*lg(300/3).

Measure Level@30m (dB μ V/m) = Measure Level@3m (dB μ V/m) - 40*lg(30/3).

Note 4: QP measurement was not performed when peak measure level was lower than the QP limit from 90kHz to 110kHz and 490kHz to 30MHz.

Note 5: AV measurement was not performed when peak measure level was lower than the AV limit from 9kHz to 90kHz and 110kHz and 490kHz.

Test Site	SIP-AC3	Test Engineer	Arvin Ding
Test Date	2022-11-17	Test Mode	Mode 2

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level@3m (dBμV/m)	Measure Level@300m or 30m ^{Note 2} (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Charging Frequency Radiated Emission								
0.128	71.378	18.770	90.148	10.148	25.460	-15.312	Peak	Coaxial
0.128	67.717	18.770	86.487	6.487	25.460	-18.973	Peak	Coplanar
Radiated Spurious Emission								
0.013	35.916	19.856	55.772	-24.228	45.325	-69.553	Peak	Coaxial
0.016	34.387	19.736	54.123	-25.877	43.522	-69.399	Peak	Coaxial
0.027	30.247	19.299	49.546	-30.454	38.977	-69.431	Peak	Coaxial
0.043	25.957	18.806	44.763	-35.237	34.935	-70.172	Peak	Coaxial
0.079	26.886	18.709	45.595	-34.405	29.652	-64.057	Peak	Coaxial
0.092	25.846	18.719	44.565	-35.435	28.328	-63.763	Peak	Coaxial
0.150	52.284	18.732	71.016	-8.984	24.082	-33.066	Peak	Coaxial
0.389	37.581	18.704	56.285	-23.715	15.805	-39.520	Peak	Coaxial
0.896	29.822	18.967	48.789	8.789	28.558	-19.769	Peak	Coaxial
1.150	23.274	18.958	42.232	2.232	26.390	-24.158	Peak	Coaxial
12.523	13.169	18.841	32.010	-7.990	29.542	-37.532	Peak	Coaxial
13.806	12.963	18.717	31.680	-8.320	29.542	-37.862	Peak	Coaxial
0.011	39.365	19.934	59.299	-20.701	46.776	-67.477	Peak	Coplanar
0.024	30.394	19.419	49.813	-30.187	40.000	-70.187	Peak	Coplanar
0.037	28.383	18.902	47.285	-32.715	36.240	-68.955	Peak	Coplanar
0.079	26.978	18.709	45.687	-34.313	29.652	-63.965	Peak	Coplanar
0.088	22.733	18.717	41.450	-38.550	28.715	-67.265	Peak	Coplanar
0.134	22.069	18.762	40.831	-39.169	25.062	-64.231	Peak	Coplanar
0.150	47.148	18.732	65.880	-14.120	24.082	-38.202	Peak	Coplanar
0.389	34.503	18.704	53.207	-26.793	15.805	-42.598	Peak	Coplanar
0.643	28.239	18.672	46.911	6.911	31.440	-24.529	Peak	Coplanar
0.896	26.014	18.967	44.981	4.981	28.558	-23.577	Peak	Coplanar
6.135	13.264	18.856	32.120	-7.880	29.542	-37.422	Peak	Coplanar
13.284	22.824	18.662	41.486	1.486	29.542	-28.056	Peak	Coplanar
Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)								
Note 2: For frequencies below 0.49MHz, the distance is 300m, otherwise is 30m.								

Note 3: $\text{Measure Level@300m (dB}\mu\text{V/m)} = \text{Measure Level@3m (dB}\mu\text{V/m)} - 40 \cdot \lg(300/3).$

$\text{Measure Level@30m (dB}\mu\text{V/m)} = \text{Measure Level@3m (dB}\mu\text{V/m)} - 40 \cdot \lg(30/3).$

Note 4: QP measurement was not performed when peak measure level was lower than the QP limit from 90kHz to 110kHz and 490kHz to 30MHz.

Note 5: AV measurement was not performed when peak measure level was lower than the AV limit from 9kHz to 90kHz and 110kHz and 490kHz.

Appendix B - Test Setup Photograph

Refer to “2211RSU024-UT” file.

Appendix C - EUT Photograph

Refer to “2211RSU024-UE” file.

The End
