Prüfbericht-Nr.: *Test Report No.:*	**CN21CMWX 001**	**Auftrags-Nr.:** *Order No.:*	**244319860**	**Seite 1 von 17** *Page 1 of 17*
Kunden-Referenz-Nr.: *Client Reference No.:*	**2090629**	**Auftragsdatum:** *Order date.:*	**2021-03-24**	
Auftraggeber: *Client:*	**Aptiv Electrical Centers (Shanghai) Co., Ltd.** Zone A, Building 7, No. 60, Yuanguo Road, Anting Town, Jiading District, 201814 Shanghai, P.R. China			
Prüfgegenstand: *Test item:*	**WIRELESS CHARGER**			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	**Wireless Charging with NFC**			
Auftrags-Inhalt: *Order content:*	**TÜV Rheinland EMC service**			
Prüfgrundlage: *Test specification:*	**FCC 47 CFR Part 15, Subpart B:2020 Class B** **ICES-003:2020**			
Wareneingangsdatum: *Date of receipt:*	**2021-09-29**			
Prüfmuster-Nr.: *Test sample No.:*	**A003135528-011**			
Prüfzeitraum: *Testing period:*	**Refer to test report**			
Ort der Prüfung: *Place of testing:*	**Refer to clause 1.1**			
Prüflaboratorium: *Testing laboratory:*	**TÜV Rheinland (Shanghai) Co., Ltd.**			
Prüfergebnis*: *Test result*:*	**Pass**			

geprüft von: / *tested* by: Jessie Xu

Datum: / *Date:* 2022-01-11 Jessie Xu

Stellung: / *Position:* Project manager

genehmigt von: / *authorized by:* Jiayi Zhou

Datum: / *Date:* 2022-01-11 Jiayi Zhou

Stellung: / *Position:* Senior manager

Sonstiges / *Other:*	

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:* — **Prüfmuster vollständig und unbeschädigt** *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	P(ass) = passed a.m. test specifications(s)	F(ail) = failed a.m. test specifications(s)	N/A = not applicable	N/T = not tested

TEST SUMMARY

5.1.1 RADIATED EMISSION (30-1000 MHz)

Result:

Passed

Contents

1 Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland (Shanghai) Co., Ltd.
Address: No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, China

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

Refer to Clause 7 for test and measurement instruments.

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary wireless charger with NFC function for household and similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Rated voltage	:	DC 12 V
Charging power	:	10 W

2.3 Independent Operation Modes

The basic operation modes are: "standby", "wireless charging" "NFC" or "off".

2.4 Description of interconnecting cables

N/A

2.5 Noise Generating and Noise Suppressing Parts

Refer to the circuit diagram for further information.

2.6 Highest frequency generated or used in the device or on which the device operates or tunes

The highest frequency used in the EUT is 27.12 MHz.

2.7 Submitted Documents

Circuit diagram.

3 Test Set-up and Operation Modes

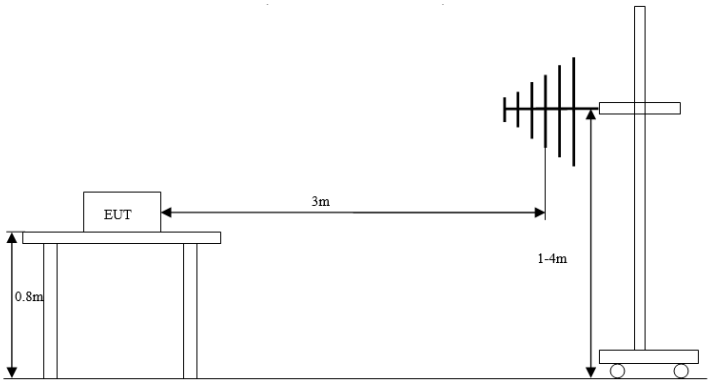
3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible emission level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.
The sequence of testing:
Radiated emission tests were performed on 2021-10-27~2021-11-02

3.2 Equipment and cable arrangement

Block diagram for radiated emission test is as follows:



(Radiated emission)

Also refer to photograph on clause 6 for test setup for radiated emission test.

3.3 Test Software

During the tests, the software “fongli_NFCTest(V1.1)” and “busInsight_V0.2.11” were used.

3.4 Special Accessories and Auxiliary Equipment

During the tests, the following auxiliary equipment were used.

Equipment	Model	Manufacturer
Charging load	-	-
Mobile phone	MATE	HUAWEI
Integrated Car interface Test System	Integrated Car interface Test System version 2.0	-
Laptop	ThinkPad T450	Thinkpad

3.5 Countermeasures to achieve EMC Compliance

No other special measure is employed to achieve the requirement.

4 Conformity Decision Rule

For all EMI tests included in this report, as measurement uncertainties are less than the values U_{CISPR} given in CISPR 16-4-2, compliance with the limits is determined by comparing measurement results directly with corresponding limits without taking into consideration of measurement uncertainties.

5 Test Results E M I S S I O N

5 . 1 Emission in the Frequency Range above 30 MHz

5.1.1 Radiated emission (30-1000 MHz)

Result:	**Passed**

Date of testing	:	2021-10-27~2021-11-02
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2020, ICES-003:2020, ANSI C63.4-2014 and CISPR 16-2-3
Product classification	:	Class B
Frequency range	:	30 – 1000 MHz (see Note 1)
Limits	:	Quasi-peak limits (3 m distance): 30 – 88 MHz, 40 dBµV/m; 88 – 216 MHz, 43.5 dBµV/m; 216 – 960 MHz, 46 dBµV/m; Above 960 MHz, 54 dBµV/m (see Note 2)
Bandwidth of EMI receiver for final measurement	:	120 kHz
Measurement time for final measurement	:	1 s
Kind of test site	:	Semi-anechoic chamber
Input voltage	:	DC 12 V
Operational mode	:	Mode 1: Power on with wireless charging Mode 2: Power on with NFC
Ambient condition	:	Temperature: 23.6 °C; Relative humidity: 52.5 %
Expanded measurement uncertainty (k=2)	:	5.49 dB

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3 m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a 80 cm wooden support above the reference ground plane. The wooden support was rotated 360° around and the height of the antenna was varied from 1 m to 4 m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

The following figures and tables were those measured by an automatic measurement system. A preview test was firstly performed with peak detector. The final test was performed with quasi-peak at those critical frequencies during the preview test. In the following spectral diagram, "×" means quasi-peak test results.

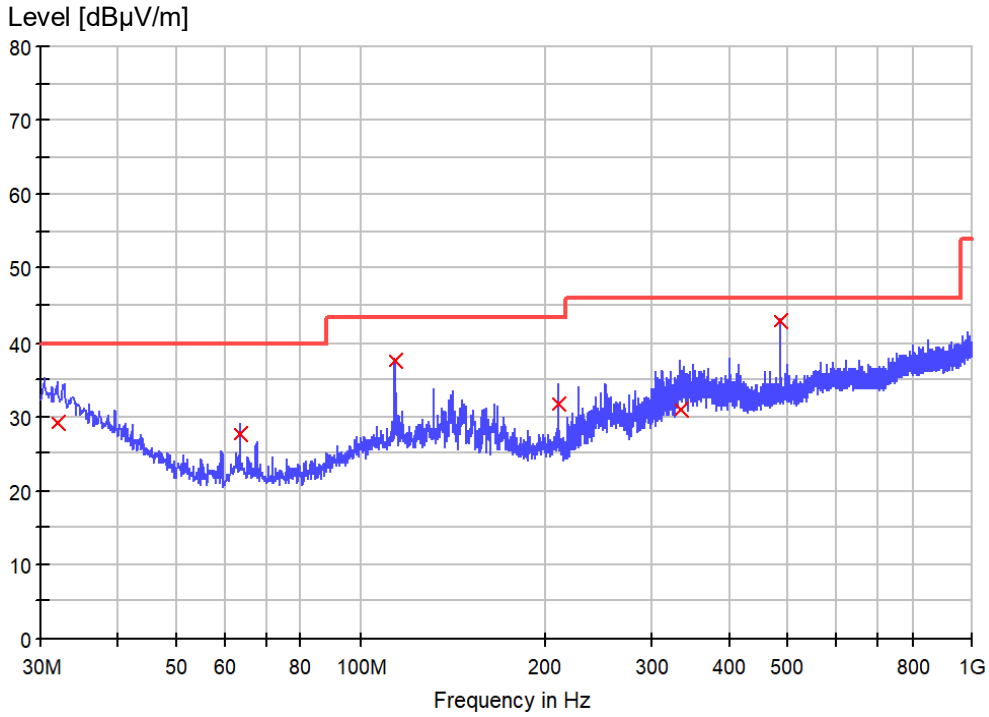
Note 1: The highest frequency in the EUT is less than 108 MHz. According to FCC Part 15 subpart B §15.33 (b) (1), the upper frequency for radiated emission measurement is 1000 MHz.

Note 2: The class B limits of FCC 47 CFR Part 15, Subpart B:2020 is stricter than those ICES-003:2020 Table 2 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

Notes on following tables of radiated emission results and conversions:

QuasiPeak (dBµV/m): final measurement results by using quasi-peak detector
Corr. (dB): correction factor including: antenna factor, cable loss, and gain of pre-amplifier (if used)
Margin: Limit (dBµV/m) - QuasiPeak (dBµV/m)

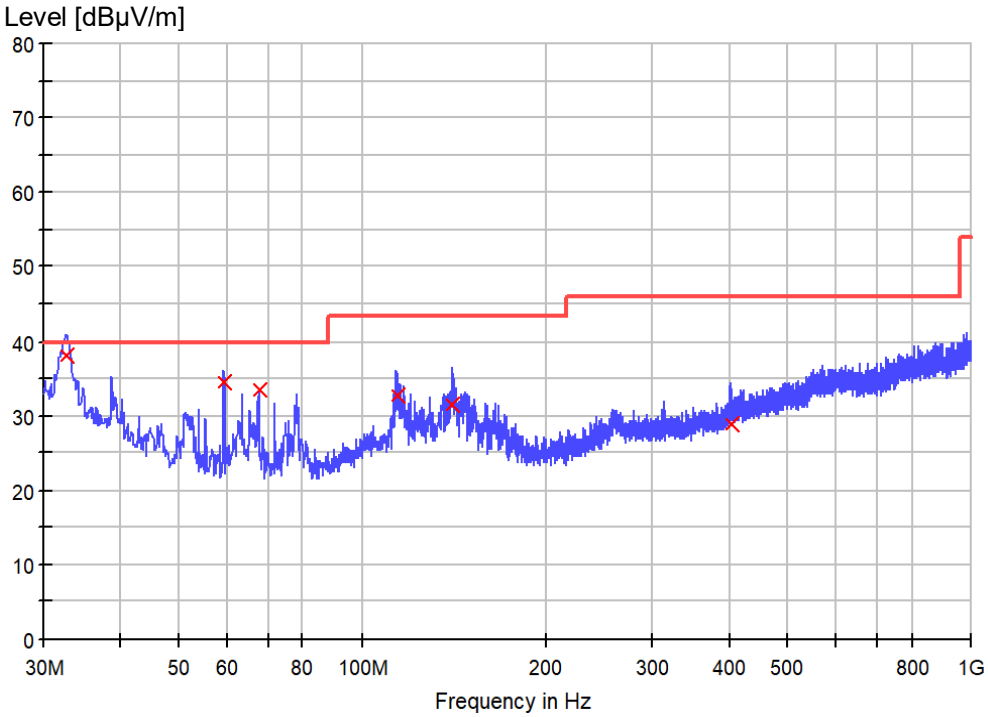
Figure 1: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization for mode 1



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/ m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.940000	29.1	1000.0	120.000	150.0	H	156.0	24.5	11.0	40.0
63.465000	27.7	1000.0	120.000	100.0	H	-28.0	12.8	12.3	40.0
114.026250	37.5	1000.0	120.000	160.0	H	180.0	18.5	6.0	43.5
209.935000	31.7	1000.0	120.000	135.0	H	78.0	16.1	11.8	43.5
332.761250	30.9	1000.0	120.000	120.0	H	-180.0	20.6	15.1	46.0
486.142500	42.9	1000.0	120.000	150.0	H	180.0	24.8	3.1	46.0

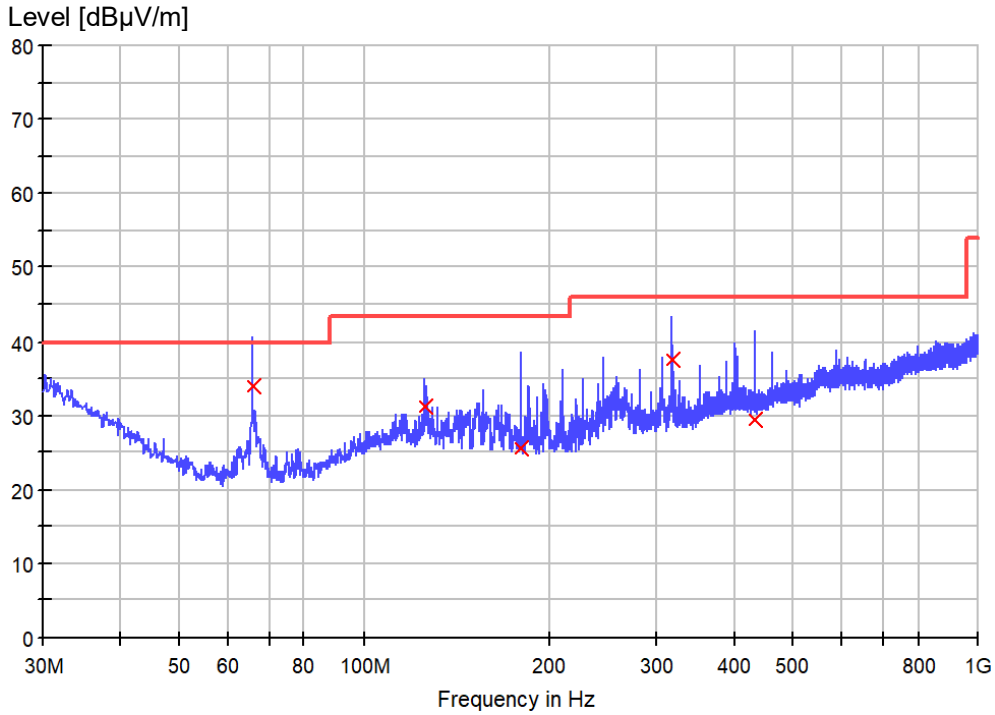
Figure 2: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization for mode 1



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/ m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.667500	38.1	1000.0	120.000	120.0	V	-90.0	24.0	1.9	40.0
59.342500	34.6	1000.0	120.000	150.0	V	-4.0	12.7	5.4	40.0
67.587500	33.6	1000.0	120.000	135.0	V	-180.0	13.0	6.4	40.0
114.147500	32.8	1000.0	120.000	110.0	V	-26.0	18.5	10.8	43.5
140.822500	31.5	1000.0	120.000	160.0	V	-180.0	18.1	12.0	43.5
404.662500	28.9	1000.0	120.000	100.0	V	180.0	22.8	17.1	46.0

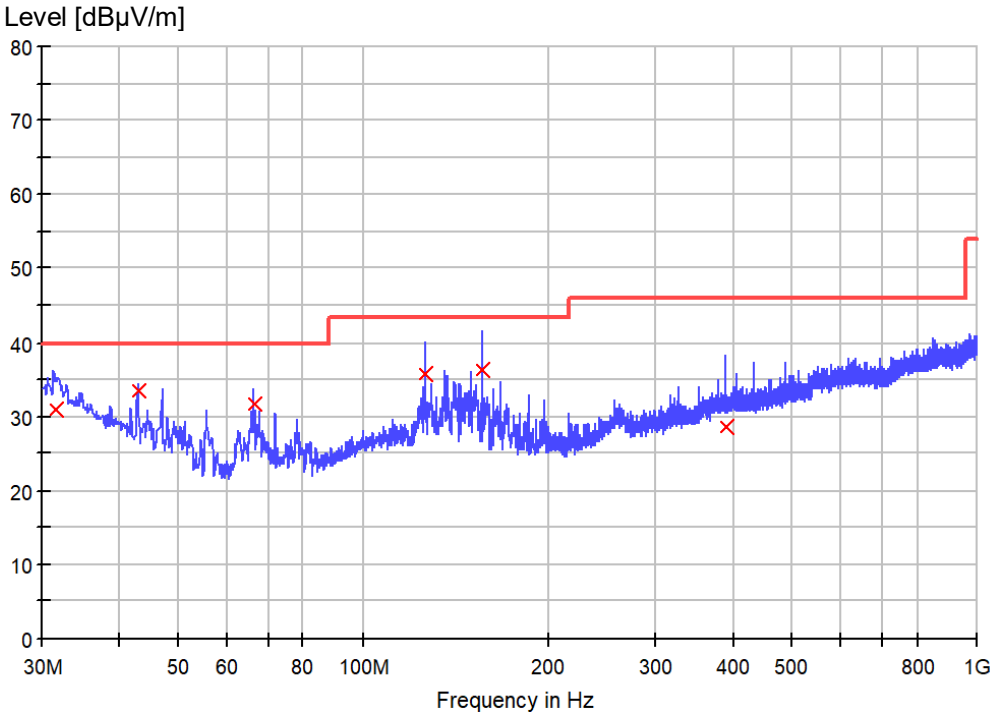
Figure 3: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization for mode 2



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/ m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
65.890000	34.1	1000.0	120.000	150.0	H	93.0	12.9	5.9	40.0
125.787500	31.3	1000.0	120.000	135.0	H	-180.0	18.8	12.3	43.5
179.986250	25.6	1000.0	120.000	100.0	H	180.0	15.9	17.9	43.5
317.847500	37.7	1000.0	120.000	120.0	H	-124.0	20.5	8.3	46.0
434.005000	29.3	1000.0	120.000	110.0	H	26.0	23.5	16.7	46.0

Figure 4: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization for mode 2

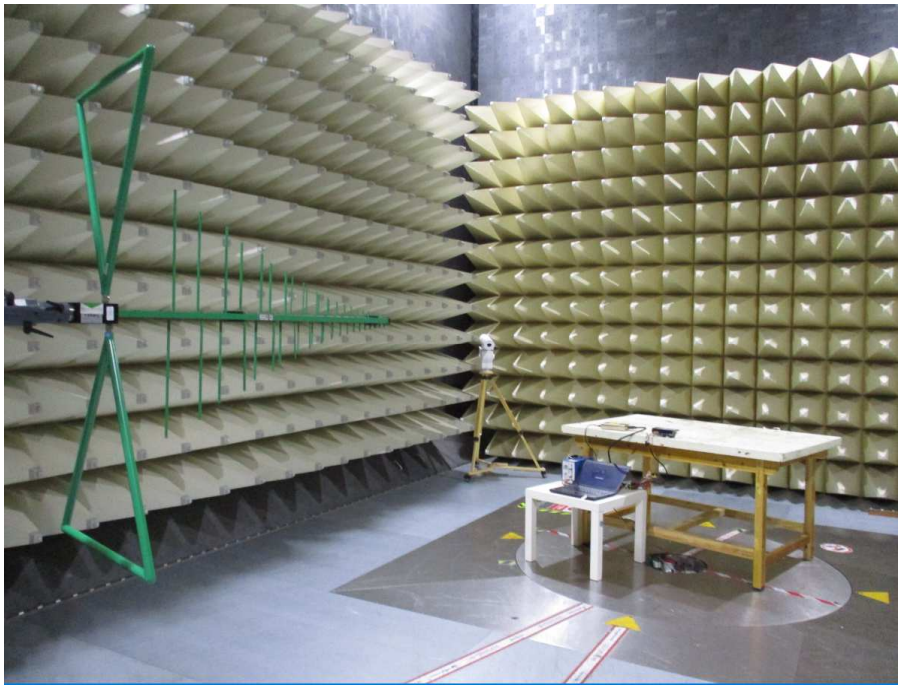


Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/ m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.576250	31.0	1000.0	120.000	125.0	V	-41.0	24.7	9.0	40.0
42.973750	33.6	1000.0	120.000	110.0	V	-173.0	18.2	6.4	40.0
66.253750	31.7	1000.0	120.000	160.0	V	103.0	13.0	8.3	40.0
126.151250	35.8	1000.0	120.000	140.0	V	180.0	18.8	7.7	43.5
155.978750	36.3	1000.0	120.000	100.0	V	-180.0	16.9	7.2	43.5
389.991250	28.6	1000.0	120.000	180.0	V	-14.0	22.1	17.4	46.0

6 Photographs of the Test Set-Up

Photograph 1: Set-up for measurement of radiated emission



7 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date DD.MM.YYYY	Due Date DD.MM.YYYY
G1811378	3m modified semi-anechoic chamber	SAC3	Frankonia	27.06.2019	27.06.2022
G1811402	EMI test receiver	ESCI	Rohde&Schwarz	01.09.2021	01.09.2022
G1811425	Bilog antenna	CBL 6112D	Teseq	10.03.2020	10.03.2023
G1824845	EMC measurement software	EMC32 (Ver 10.20.01)	Rohde&Schwarz	N/A	N/A

8 List of Figures

9 List of Photographs

End of test report