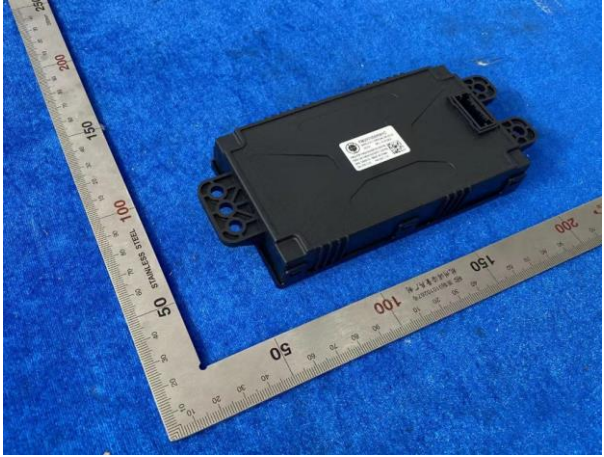


Prüfbericht-Nr.: Test Report No.:	CN22BUMZ 001	Auftrags-Nr.: Order No.:	244453659	Seite 1 von 16 Page 1 of 16
Kunden-Referenz-Nr.: Client Reference No.:	1668305	Auftragsdatum: Order date.:	2022-10-08	
Auftraggeber: Client:	Aptiv Electrical Centers (Shanghai) Co., Ltd. Zone A, Building 7, No 60, Yuanguo Road, Anting Town, Jiading District, 201814 Shanghai, P. R. China			
Prüfgegenstand: Test item:	Wireless Charger			
Bezeichnung / Typ-Nr.: Identification / Type No.:	15W Wireless Charger			
Auftrags-Inhalt: Order content:	TÜV Rheinland EMC service			
Prüfgrundlage: Test specification:	FCC Part 15, Subpart B:2021 Class B ICES-003:2020			
Wareneingangsdatum: Date of receipt:	2022-11-01			
Prüfmuster-Nr.: Test sample No.:	A003363831-010			
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		genehmigt von: / authorized by: Hexiong Liu		
Datum: / Date: 2023-02-07 <i>Jessie Xu</i>		Datum: / Date: 2023-02-07 <i>Hexiong Liu</i>		
Stellung: / Position: Project manager		Stellung: / Position: Department 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				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V05

Prüfbericht - Nr.: CN22BUMZ 001
Test Report No.:

Seite 2 von 16
Page 2 of 16

TEST SUMMARY

5.1.1 RADIATED EMISSION (30-1000 MHz)

Result:

Passed

Contents

1	TEST SITES	4
1.1	TEST FACILITIES	4
2	GENERAL PRODUCT INFORMATION	5
2.1	PRODUCT FUNCTION AND INTENDED USE	5
2.2	RATINGS AND SYSTEM DETAILS	5
2.3	INDEPENDENT OPERATION MODES	5
2.4	DESCRIPTION OF INTERCONNECTING CABLES	5
2.5	NOISE GENERATING AND NOISE SUPPRESSING PARTS	5
2.6	HIGHEST FREQUENCY GENERATED OR USED IN THE DEVICE OR ON WHICH THE DEVICE OPERATES OR TUNES	5
2.7	SUBMITTED DOCUMENTS	5
3	TEST SET-UP AND OPERATION MODES	6
3.1	PRINCIPLE OF CONFIGURATION SELECTION	6
3.2	EQUIPMENT AND CABLE ARRANGEMENT	6
3.3	TEST SOFTWARE	6
3.4	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	6
3.5	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	6
4	CONFORMITY DECISION RULE	7
5	TEST RESULTS EMISSION	8
5.1	EMISSION IN THE FREQUENCY RANGE ABOVE 30 MHz	8
5.1.1	Radiated emission (30-1000 MHz)	8
6	PHOTOGRAPHS OF THE TEST SET-UP	14
7	LIST OF TEST AND MEASUREMENT INSTRUMENTS	15
8	LIST OF FIGURES	16
9	LIST OF PHOTOGRAPHS	16

Prüfbericht - Nr.: CN22BUMZ 001
Test Report No.:

Seite 4 von 16
Page 4 of 16

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 used in vehicle. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Rated voltage : DC 12 V
Charging power : 15 W

2.3 Independent Operation Modes

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

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 8 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.

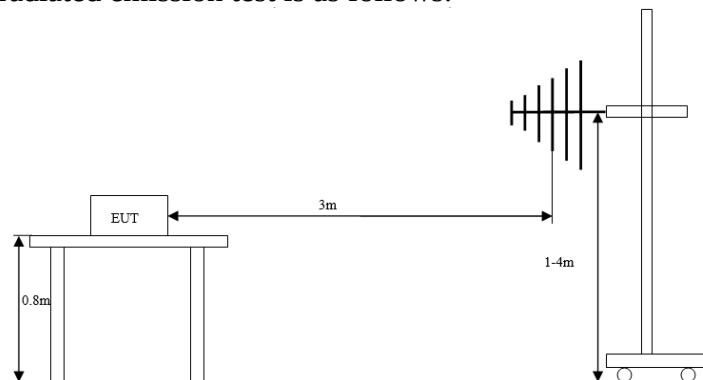
Refer to the related paragraph of this report.

The sequence of testing:

Radiated emission tests were performed on 2023-02-06

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 “busInsight_V0.2.11” was used.

3.4 Special Accessories and Auxiliary Equipment

During the tests, the following auxiliary equipment were used.

Equipment	Model	Manufacturer
Mobile phone	iPhone 13	iPhone
Integrated Car interface Test System	Integrated Car interface Test System version 2.0	-
PCAN-LWL	IPEH-002026	PEAK
Laptop	ThinkPad T450	Thinkpad

3.5 Countermeasures to achieve EMC Compliance

No other special measure is employed to achieve the requirement.

Prüfbericht - Nr.: CN22BUMZ 001

Test Report No.:

Seite 7 von 16

Page 7 of 16

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 EMISSION

5.1 Emission in the Frequency Range above 30 MHz

5.1.1 Radiated emission (30-1000 MHz)

Result:	Passed
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Date of testing	: 2023-02-06
Test procedure	: FCC Part 15, Subpart B:2021, 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 dB μ V/m; 88 – 216 MHz, 43.5 dB μ V/m; 216 – 960 MHz, 46 dB μ V/m; Above 960 MHz, 54 dB μ V/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: Charging with load Mode 2: Standby
Ambient condition	: Temperature: 19.3 °C; Relative humidity: 46.1 %
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, “ $\times$ ” 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.

Prüfbericht - Nr.: CN22BUMZ 001

Test Report No.:

Seite 9 von 16

Page 9 of 16

Note 2: The class B limits of FCC Part 15, Subpart B:2021 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.

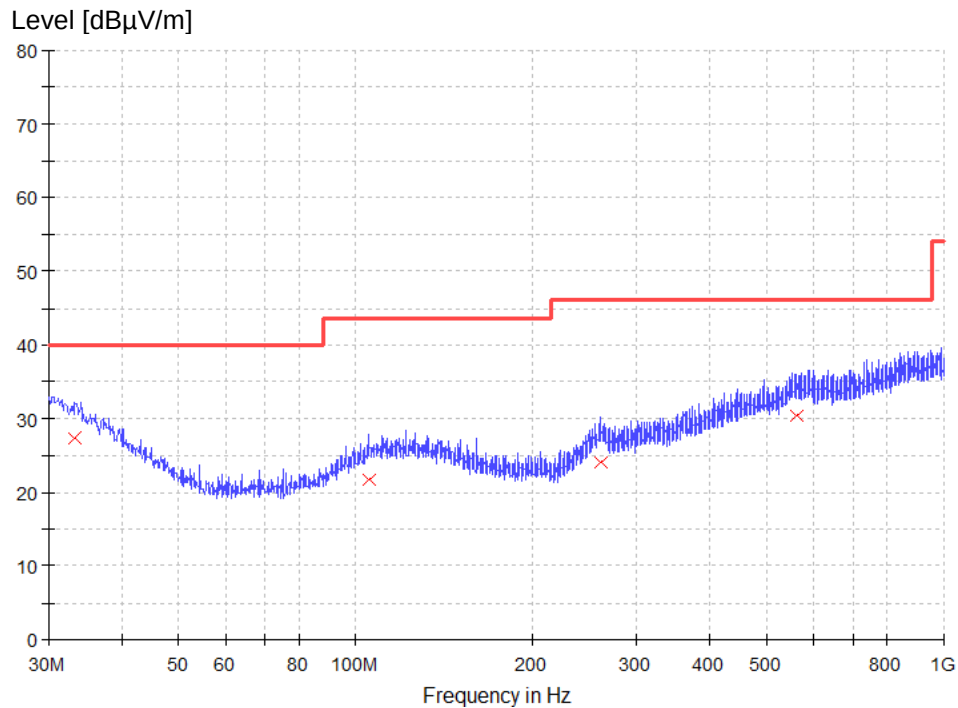
Notes on following tables of radiated emission results and conversions:

QuasiPeak (dB μ V/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 (dB μ V/m) - QuasiPeak (dB μ V/m)

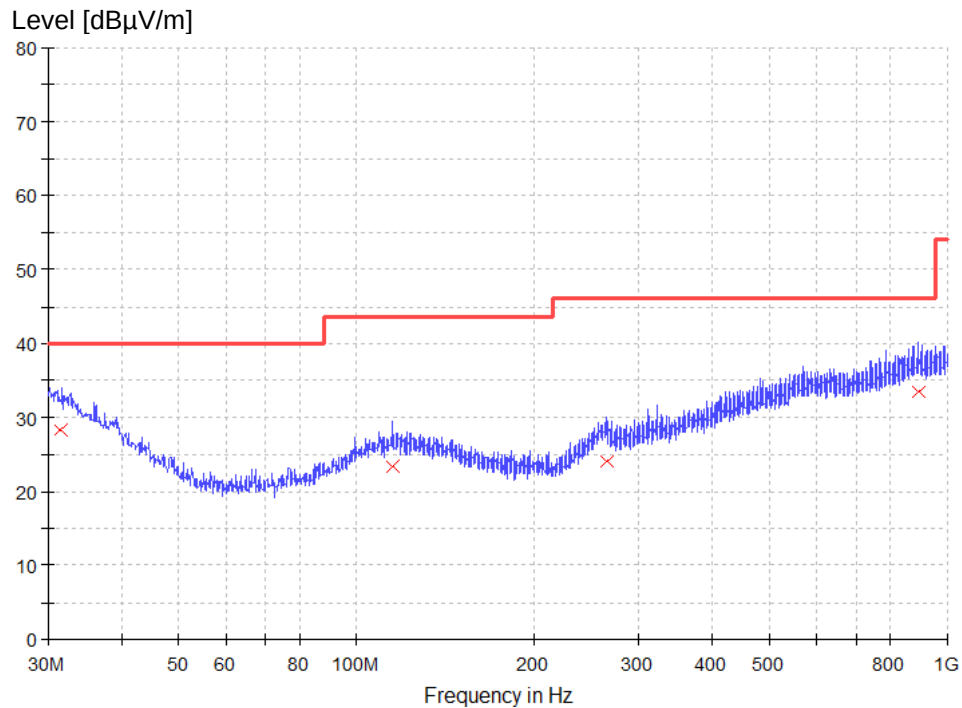
Figure 1: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
33.273750	27.4	120.000	100.0	H	180.0	23.7	12.6	40.0
105.053750	21.7	120.000	125.0	H	154.0	18.3	21.8	43.5
260.617500	24.1	120.000	150.0	H	-100.0	20.7	22.0	46.0
561.317500	30.4	120.000	100.0	H	90.0	26.3	15.6	46.0

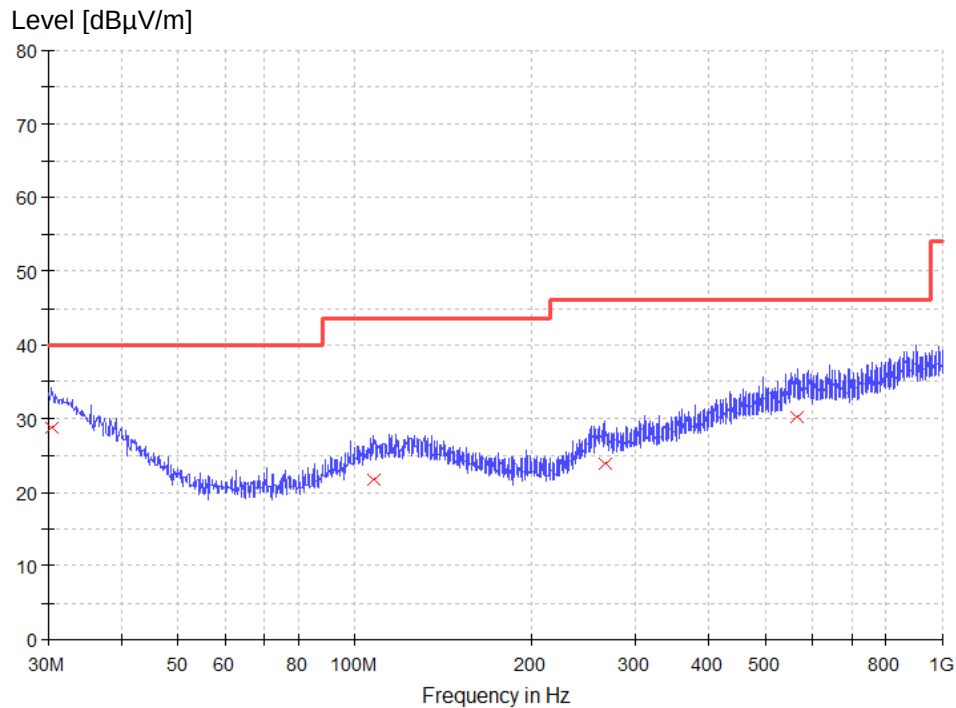
Figure 2: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
31.697500	28.4	120.000	130.0	V	-180.0	24.6	11.7	40.0
114.875000	23.3	120.000	105.0	V	180.0	18.6	20.2	43.5
265.467500	24.0	120.000	100.0	V	-98.0	20.6	22.0	46.0
894.270000	33.5	120.000	100.0	V	-180.0	28.4	12.5	46.0

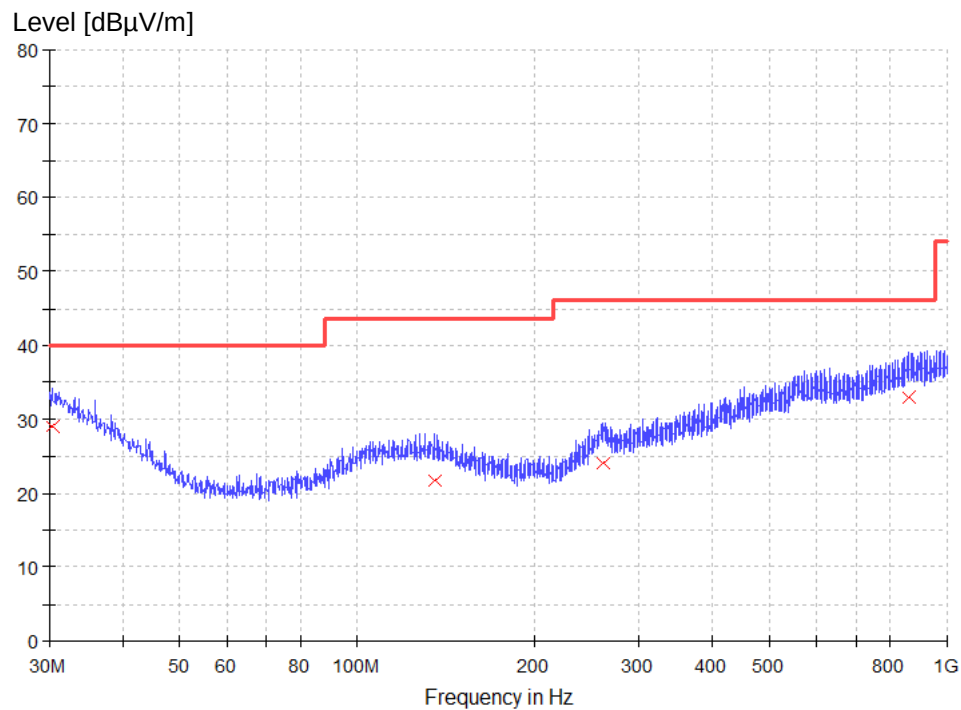
Figure 3: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
30.485000	28.9	120.000	120.0	H	22.0	25.2	11.2	40.0
107.963750	21.7	120.000	150.0	H	124.0	18.4	21.8	43.5
266.195000	23.8	120.000	200.0	H	-180.0	20.5	22.2	46.0
567.380000	30.2	120.000	140.0	H	99.0	26.2	15.9	46.0

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

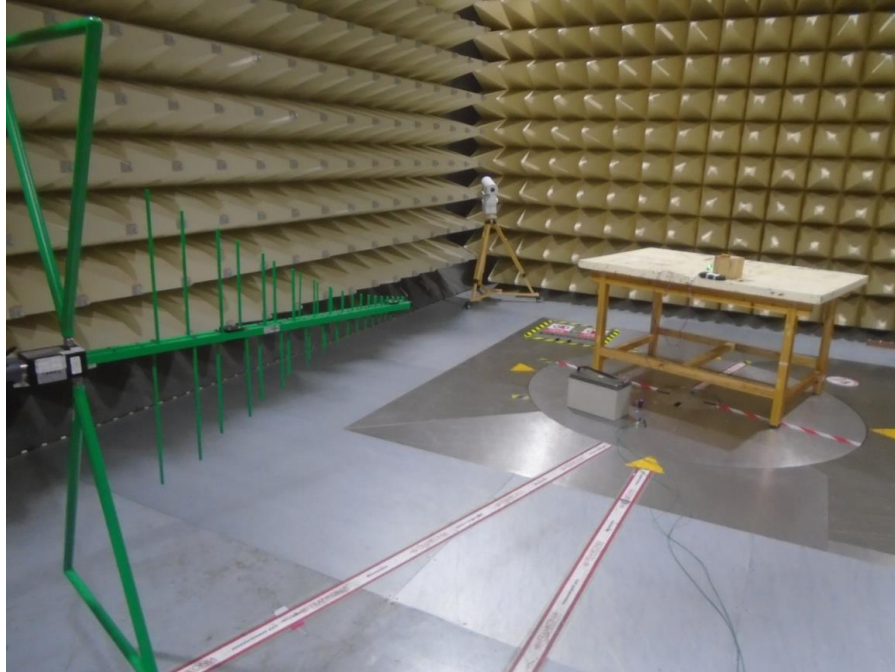


Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
30.363750	29.0	120.000	120.0	V	-157.0	25.2	11.0	40.0
134.881250	21.7	120.000	150.0	V	100.0	18.4	21.8	43.5
261.466250	24.1	120.000	100.0	V	-45.0	20.7	21.9	46.0
862.260000	33.0	120.000	132.0	V	180.0	27.9	13.0	46.0

6 Photographs of the Test Set-Up

Photograph 1: Set-up for measurement of radiated emission



Prüfbericht - Nr.: CN22BUMZ 001

Test Report No.:

Seite 15 von 16

Page 15 of 16

7 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date DD.MM.YYYY	Due Date DD.MM.YYYY
G1824845	EMC measurement software	EMC32 (Ver 10.20.01)	Rohde&Schwarz	N/A	N/A
G1811378	3m modified semi-anechoic chamber	SAC3	Frankonia	10.06.2021	10.06.2024
9042162	EMI test receiver	ESR7	Rohde&Schwarz	02.03.2022	02.03.2023
G1811425	Bilog antenna	CBL 6112D	Teseq	10.03.2020	10.03.2023

Prüfbericht - Nr.: CN22BUMZ 001

Test Report No.:

Seite 16 von 16

Page 16 of 16

8 List of Figures

Figure 1: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 1	10
Figure 2: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 1	11
Figure 3: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization on mode 2	12
Figure 4: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2	13

9 List of Photographs

Photograph 1: Set-up for measurement of radiated emission.....	14
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End of test report