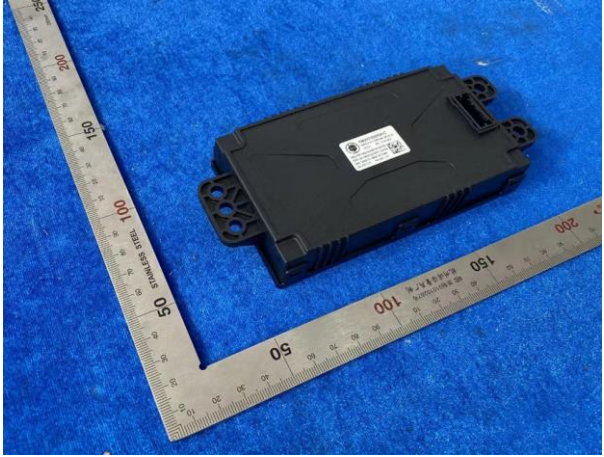


| | | | | |
|--|---|--|-------------------|---|
| Prüfbericht-Nr.: <i>Test Report No.:</i> | CN22BUMZ 001 | Auftrags-Nr.: <i>Order No.:</i> | 244453659 | Seite 1 von 16 <i>Page 1 of 16</i> |
| Kunden-Referenz-Nr.: <i>Client Reference No.:</i> | 1668305 | Auftragsdatum: <i>Order date.:</i> | 2022-10-08 | |
| Auftraggeber: <i>Client:</i> | Aptiv Electrical Centers (Shanghai) Co., Ltd. Zone A, Building 7, No 60, Yuanguo Road, Anting Town, Jiading District, 201814 Shanghai, P. R. China | | | |
| Prüfgegenstand: <i>Test item:</i> | Wireless Charger | | | |
| Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i> | 15W Wireless Charger | | | |
| Auftrags-Inhalt: <i>Order content:</i> | TÜV Rheinland EMC service | | | |
| Prüfgrundlage: <i>Test specification:</i> | FCC Part 15, Subpart B:2021 Class B ICES-003:2020 | | | |
| Wareneingangsdatum: <i>Date of receipt:</i> | 2022-11-01 |  | | |
| Prüfmuster-Nr.: <i>Test sample No.:</i> | A003363831-010 | | | |
| Prüfzeitraum: <i>Testing period:</i> | Refer to test report | | | |
| Ort der Prüfung: <i>Place of testing:</i> | Refer to clause 1.1 | | | |
| Prüflaboratorium: <i>Testing laboratory:</i> | TÜV Rheinland (Shanghai) Co., Ltd. | | | |
| Prüfergebnis*: <i>Test result*:</i> | 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 / <i>Other:</i> | | | | |
| Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i> | | Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i> | | |
| * Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) Legend: P(ass) = passed a.m. test specifications(s) | | F(ail) = entspricht nicht o.g. Prüfgrundlage(n) F(ail) = failed a.m. test specifications(s) | | N/A = nicht anwendbar N/A = not applicable |
| | | | | N/T = nicht getestet 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

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TEST SUMMARY

5.1.1 RADIATED EMISSION (30-1000 MHz)

Result:
Passed

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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.

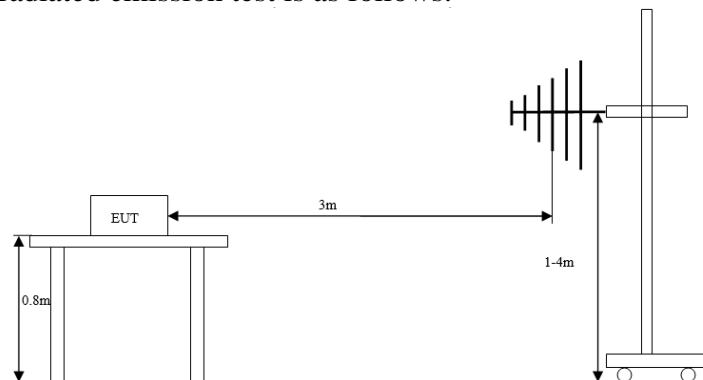
Refer to the related paragraph of this report.

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.

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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 |
|----------------|---------------|

| | |
|---|---|
| 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, “×” 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.

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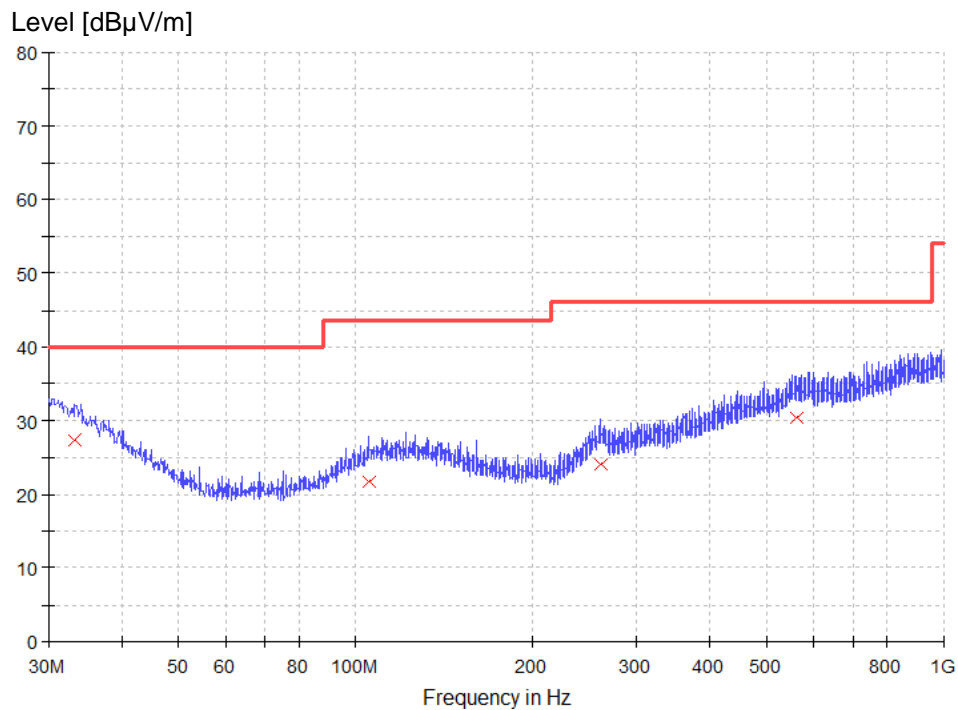
Note 2: The class B limits of FCC Part 15, Subpart B:2021 is stricter than those ICES-003:2020 Table 2 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

Notes on following tables of radiated emission results and conversions:

QuasiPeak (dB μ V/m): final measurement results by using quasi-peak detector

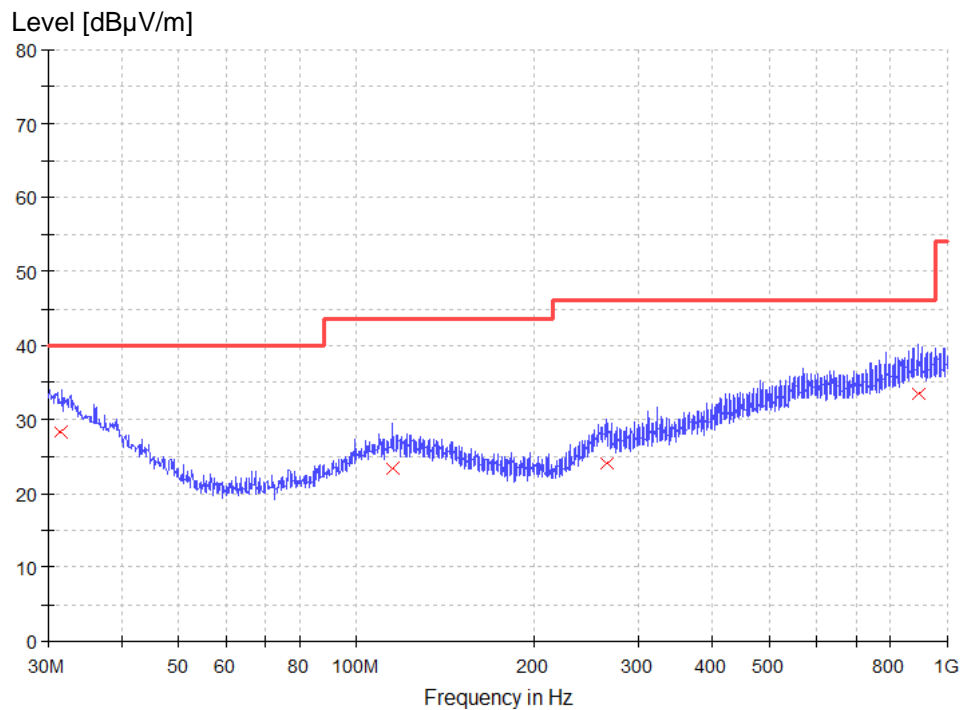
Corr. (dB): correction factor including: antenna factor, cable loss, and gain of pre-amplifier (if used)

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


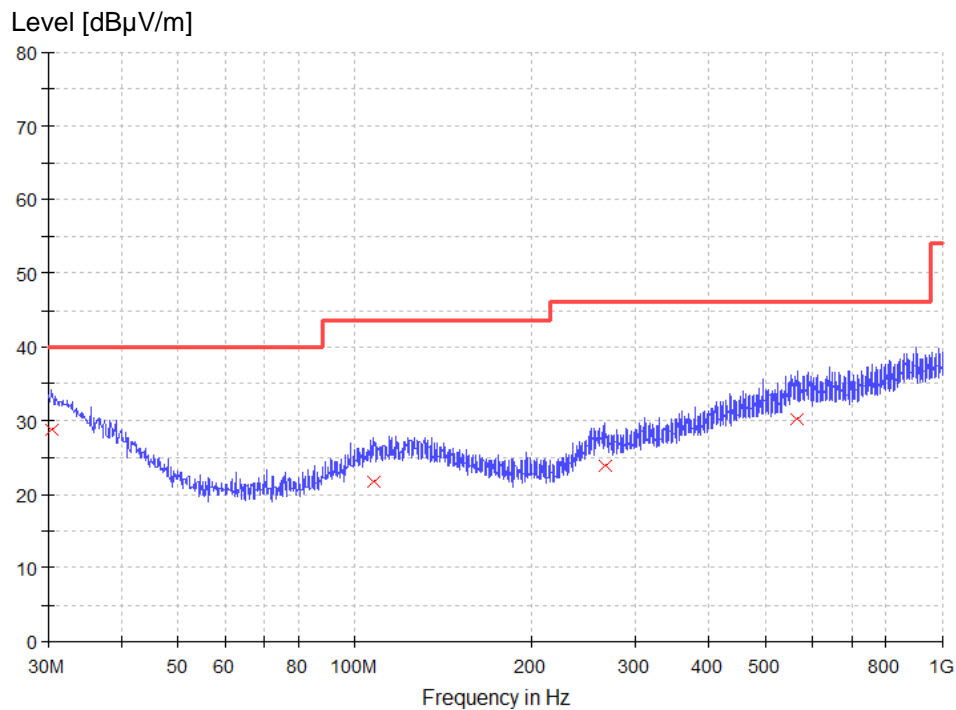
Final quasi-peak measurement results:

| 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


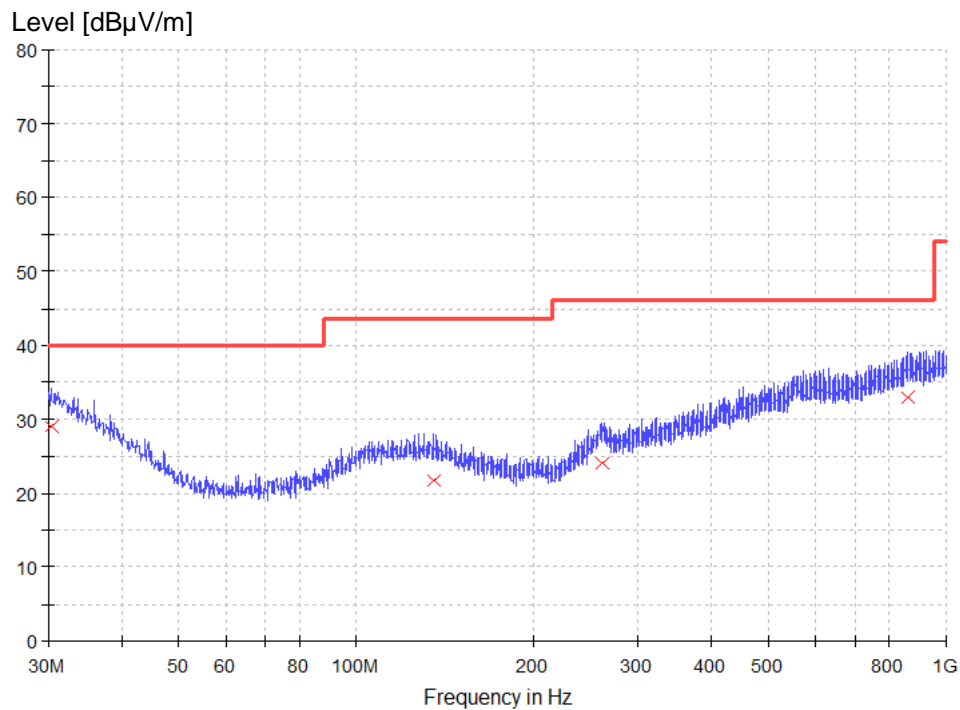
Final quasi-peak measurement results:

| 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 |

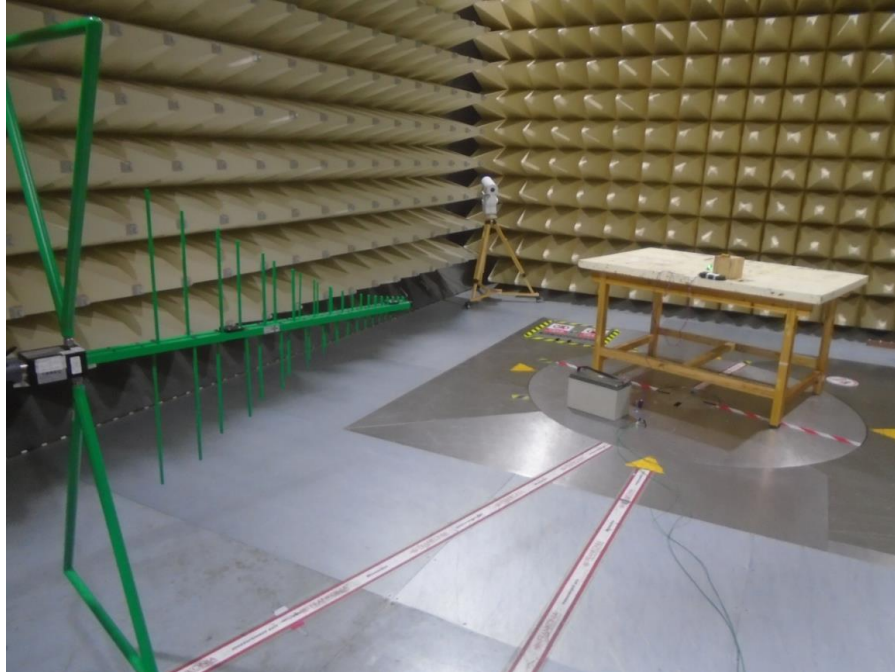
Figure 4: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization on mode 2


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



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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 |

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End of test report