

Prüfbericht-Nr.: Test report no.:	CN25SGNK 001	Auftrags-Nr.: Order no.:	180330283	Seite 1 von 17 Page 1 of 17
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2025.04.14	
Auftraggeber: Client:	Shenzhen ENGWE Industrial (Group) Co., Ltd Room 413, 4th Floor, No. 137 Xuegang South Road, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen 518129 Guangdong P.R. China			
Prüfgegenstand: Test item:	EPAC Bicycle			
Bezeichnung / Typ-Nr.: Identification / Type no.:	EP-2 3.0 BOOST			
Auftrags-Inhalt: Order content:	TÜV Rheinland – EMC Service			
Prüfgrundlage: Test specification:	EN 15194:2017, Clause 4.2.15			
Wareneingangsdatum: Date of sample receipt:	2025.04.14			
Prüfmuster-Nr.: Test sample no.:	A003902208-005			
Prüfzeitraum: Testing period:	2025.04.24 - 2025.05.09			
Ort der Prüfung: Place of testing:	Refer to section 1.1			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	<i>Keda Zhou</i>	genehmigt von: authorized by:	<i>Chonghai Liang</i>	
Datum: Date:	2025.06.03	Ausstelldatum: Issue date:	2025.06.03	
Stellung / Position:	Keda Zhou/PE	Stellung / Position:	Chonghai Liang/Authorizer	
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 specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
<p>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></p>				

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Test report no.:

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Anmerkungen
Remarks

- | | |
|---|--|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.
Detaillierte Informationen bezüglich Prüfbedingungen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p> |
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| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.
Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p> |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p> |

Test Summary

5.1.1 RADIATED DISTURBANCE IN THE FREQUENCY RANGE FROM 30MHZ TO 1000MHZ

Result:

Pass

6.1.1 ELECTROSTATIC DISCHARGE

Result:

Pass

6.1.2 RADIO FREQUENCY ELECTROMAGNETIC FIELD

Result:

Pass

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1. Test Sites

1.1 Test Facilities

Laboratory A: TÜV Rheinland /CCIC (Ningbo) Co., Ltd.

Address: 1st Floor, Building 11, Scholar Innovation Park, No.1188 Zhongguan Road, Zhenhai District, Ningbo 315200 P.R. China

Laboratory B: EMTEK (NINGBO) CO., LTD.

No. 8, Building 8, Lane 216, Qingyi Road, High-tech Zone, Ningbo, Zhejiang, China.

The used test equipment is in accordance with CISPR 16-1 series standards.

The RS test was performed on lab B. The other tests were performed on lab A.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment, Laboratory A

Kind of Equipment	Type	Serial No.	Calibrated until
EMI test receiver	ESR7	101929	2025.10.22
Bilog Antenna	CBL6112D	49033	2027.03.16
ESD generator	NX30.1	11744	2025.11.19

Table 2: List of Test and Measurement Equipment, Laboratory B

Kind of Equipment	Type	Serial No.	Calibrated until
RF Signal generator	N5171B	MY61252820	2026.01.03
SW-RF	JSDSW-BS02	JSDSW2120D01	2026.01.03
Power Amplifier	VBA 1000-600c	132035	2026.01.03
Power Amplifier	VBA 1060-200	132120	2026.01.03
Directional couplers	BDC 0810-50/1500	2129259-01	2026.01.03
Directional couplers	BDC 1060-40/500	2129304-03	2026.01.03
Multilayer periodic antenna	STLP9129-7/16	03043	2026.01.03
Power meter	LSPM	86	2026.01.03
Power meter	LSPM	90	2026.01.03
RF Signal generator	SMC100A	108730	2026.01.03
Power Amplifier	VBA 200-3000	132413	2026.01.03
Directional couplers	BDC 0125-50/3000	2129259-02	2026.01.03

1.3 Uncertainty of Measurement

Table 3: Measurement Uncertainty

Test Item	Expanded Measurement Uncertainty (k=2)
Radiated Emission (30-1000MHz)	3.80 dB

2. General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an EPAC Bicycle.
For more detail information, refer to the user's manual.

2.2 Ratings and System Details

Table 4: General Description of EUT

General Description of EUT	
Internal battery voltage:	DC 48V
Protection Class:	Class II

2.3 Independent Operation Modes

There are some modes:
Mode A: Continuous working
Mode B: Standby

2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram for further information.

2.5 Submitted Documents

Circuit diagram, label, user manual etc.

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 radiation level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

Immunity: The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

3.2 Physical Configuration for Testing

Refer to the related paragraph of this report.

3.3 Test Operation and Test Software

Refer to the related paragraph of this report. No software was used.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to Achieve ERM Compliance

The test sample which has been tested contained the noise suppression parts as described in the Circuit Diagram. No additional measures were employed to achieve compliance.

4. Conformity Decision Rule

For all EMI tests (when 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. For all EMS tests (when included in this report), measurement uncertainties are not considered as well according to corresponding test standards.

5. Test Results EMISSION

5.1 Emission in the Frequency Range above 30 MHz

5.1.1 Radiated Disturbance in the Frequency Range from 30MHz to 1000MHz

Result:	Pass
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Date of testing	: 2025.04.24
Test procedure	: EN 15194:2017 & CISPR 12:2007
Frequency range	: 30-1000MHz
Kind of test site	: Semi-anechoic Chamber
Measurement Distance	: 3m
Limit	: Quasi-peak limits (3m test distance, broad-band): 30-75MHz, 44dB μ V/m; 75-400MHz, 44-55dB μ V/m (The limits increase linearly with the logarithm of the frequency); 400-1000MHz, 55dB μ V/m. Mean value limits (3m test distance, narrow-band): 30-75MHz, 34dB μ V/m; 75-400MHz, 34-45dB μ V/m (The limits increase linearly with the logarithm of the frequency); 400-1000MHz, 45dB μ V/m.

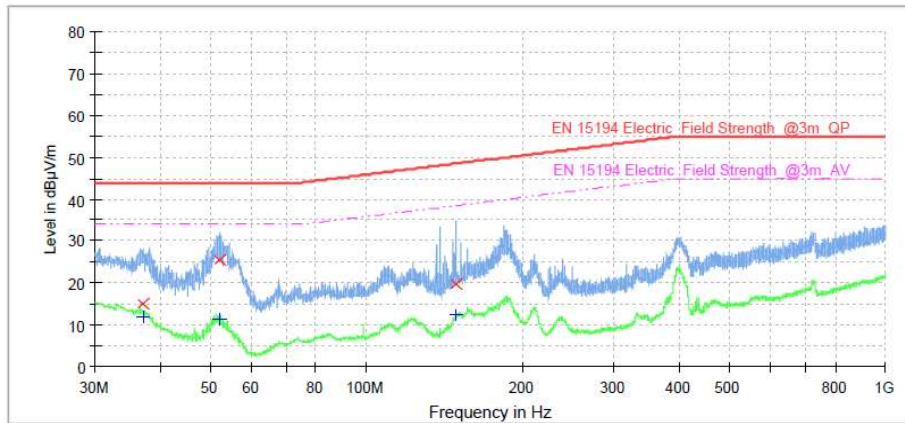
Test Setup

Operational mode	: Mode A
Ambient condition	: Temperature: 21°C; Relative humidity: 65%

Measuring configuration and description

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3m. 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 height of the antenna was 1 m. 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 detector at those critical frequencies during the preview test.

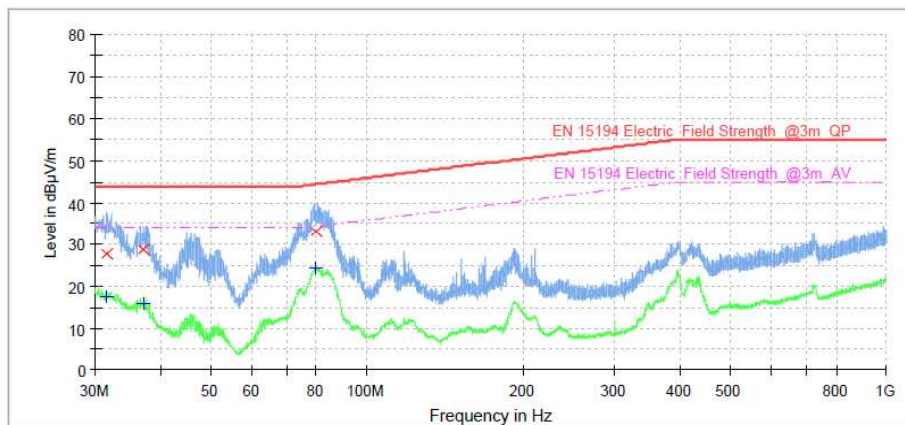
Figure 1: Spectral Diagrams, Radiated disturbance, Left
 horizontal

Limit and Margin-QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
37.050000	15.1	1000.0	120.000	180.0	H	11.0	15.0	28.9	44.0
51.950000	25.3	1000.0	120.000	180.0	H	11.0	5.3	18.7	44.0
149.150000	19.7	1000.0	120.000	180.0	H	11.0	8.9	28.8	48.5

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
37.050000	12.1	1000.0	120.000	180.0	H	11.0	15.0	21.9	34.0
51.950000	11.3	1000.0	120.000	180.0	H	11.0	5.3	22.7	34.0
149.150000	12.3	1000.0	120.000	180.0	H	11.0	8.9	26.2	38.5

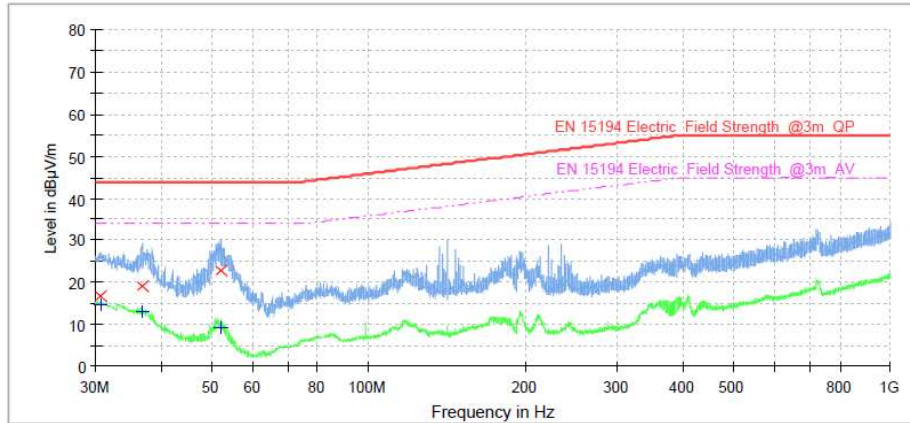
vertical


Limit and Margin-QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.600000	27.9	1000.0	120.000	180.0	V	11.0	17.9	16.1	44.0
37.100000	28.9	1000.0	120.000	180.0	V	11.0	15.0	15.1	44.0
79.700000	33.2	1000.0	120.000	180.0	V	11.0	9.9	11.2	44.4

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
31.600000	17.8	1000.0	120.000	180.0	V	11.0	17.9	16.2	34.0
37.100000	16.2	1000.0	120.000	180.0	V	11.0	15.0	17.8	34.0
79.700000	24.4	1000.0	120.000	180.0	V	11.0	9.9	10.0	34.4

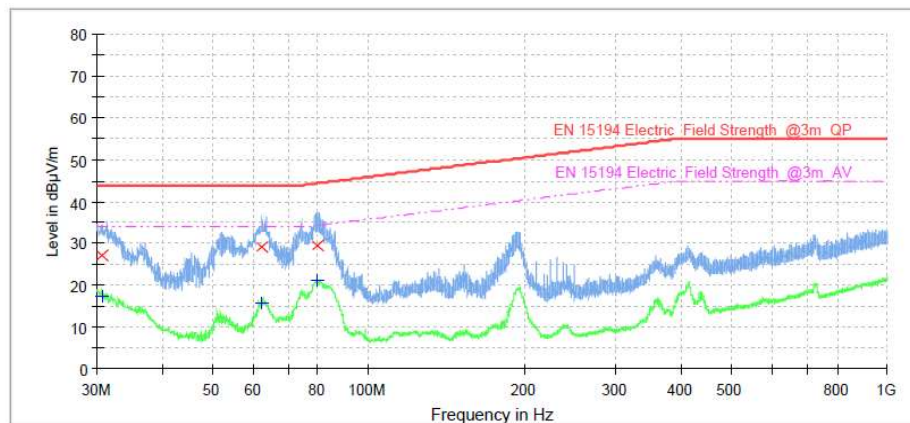
Figure 2: Spectral Diagrams, Radiated disturbance, Right
 horizontal

Limit and Margin-QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.650000	16.8	1000.0	120.000	180.0	H	191.0	18.4	27.2	44.0
36.750000	18.9	1000.0	120.000	180.0	H	191.0	15.2	25.1	44.0
52.050000	22.8	1000.0	120.000	180.0	H	191.0	5.3	21.3	44.0

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
30.650000	14.9	1000.0	120.000	180.0	H	191.0	18.4	19.1	34.0
36.750000	13.0	1000.0	120.000	180.0	H	191.0	15.2	21.0	34.0
52.050000	9.5	1000.0	120.000	180.0	H	191.0	5.3	24.5	34.0

vertical


Limit and Margin-QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.550000	27.1	1000.0	120.000	180.0	V	191.0	18.4	16.9	44.0
62.350000	29.1	1000.0	120.000	180.0	V	191.0	5.5	14.9	44.0
79.950000	29.3	1000.0	120.000	180.0	V	191.0	9.9	15.1	44.4

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
30.550000	17.4	1000.0	120.000	180.0	V	191.0	18.4	16.6	34.0
62.350000	15.9	1000.0	120.000	180.0	V	191.0	5.5	18.1	34.0
79.950000	21.0	1000.0	120.000	180.0	V	191.0	9.9	13.5	34.4

6. Test Results IMMUNITY

During the immunity tests, the EUT was operated under conditions specified by clause 3.1 and clause 5.1.2 of this report.

Performance criterion: A vehicle is deemed to fulfil the requisite immunity conditions if, during the tests carried out in the manner required by this clause, there are no abnormal changes in the speed of the vehicle's drive wheels, there are no signs of operational deterioration which might mislead other road users and there are no other noticeable phenomena which could result in a deterioration in the direct control of the vehicle.

Testing date: 2025.04.25 - 2025.05.09
Room temperature: 18-22°C
Relative Humidity: 45-64% (45% for ESD)
Atmospheric pressure: 102.1 kPa

6.1 Enclosure

6.1.1 Electrostatic Discharge

Result:	Pass
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During the test, the EUT was placed on 0.8m wood table above the ground plane. The minimum distance between the EUT and all other conductive structures except the ground plane beneath the EUT is more than 0.5m. The size of the reference ground plane is more than 2m by 2m.

A vertical coupling plane (VCP) of dimensions 0.5m x 0.5m is placed parallel to and positioned at a distance of 0.1m from the EUT.

Test procedure : EN 61000-4-2:2009
 Test level : Annex C.8 of EN 15194:2017
 : ±2.0kV, ±4.0kV contact discharge;
 : ±2.0kV, ±4.0kV, ±8.0kV air discharge
 Polarity : Positive / Negative
 Number of discharges : ≥10 for contact discharge at each point;
 : ≥10 for air discharge at each point
 Performance criteria : B

Table 5: ESD, Positive / Negative Polarity

Position	Kind of Discharge	Remarks	Result
Button	Air discharge ±8kV	During the test and after the test, the EUT can operate as intended.	Pass
Nonmetal enclosure	Air discharge ±8kV	Ditto	Pass
Metal enclosure	Contact discharge ±4kV	Ditto	Pass
Coupling plane (VCP)	Contact discharge ±4kV	Ditto	Pass

6.1.2 Radio Frequency Electromagnetic Field

Result:	Pass
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During the tests on the vehicle, only non-interference-generating equipment may be used. Under normal conditions, the vehicle was facing the antenna. The phase mid-point of all antennas was not less than 1.5 m above the vehicle plane. No part of the antenna radiator elements was less than 0.25 m from the vehicle plane. Greater homogeneity of the field might be obtained by placing the field generator as far as technically possible from the vehicle. The actual measuring distance was 2 m. The radiator elements of the field generator were not less than 0.5 m from any type of radio frequency absorption material and not less than 1.5 m from the wall of the installation in question. There was no absorption material between the transmitting antenna and the vehicle under test.

The field generator shall be positioned in the median longitudinal plane of the vehicle. The reference point was the point at which the field strengths were established and was defined as follows: a) horizontally, at least 2 m from the antenna phase mid-point; b) in the median longitudinal plane of the vehicle; c) at a height of (1.0 ± 0.05) m above the vehicle plane; and at (0.2 ± 0.2) m behind the vertical centre line of the vehicle's front wheel in the case of bicycles. The "substitution method" was used for the purpose of creating the field test conditions. During the calibration phase (before the vehicle was positioned on the test surface) the field strength was not less than 50% of the nominal field strength at the following location: for all field-generating devices, (1.0 ± 0.02) m on either side of the reference point on a line passing through this point, and perpendicular to the median longitudinal plane of the vehicle.

During the tests, except standstill mode, the engine of the EUT turned the driving wheels at a constant speed predetermined. All vehicle systems were operating normally. There was no electrical connection between the vehicle and the test surface and no connections between the vehicle and the equipment, contact between the wheels and the test surface was not regarded as an electrical connection.

Basic standard	: Annex C.4 of EN 15194:2017
Test level	: 30V/m
Frequency range	: 20-2000MHz
Modulation	: 80% 1kHz AM
Frequency scan speed	: Frequency step: 2% (according to ISO 11451-1) Dwell time: 2s
Performance criteria	: A

Table 6: Radiated Susceptibility

Position	Observation	Result
Vertical	During the test and after the test, the EUT can operate as intended.	Pass

7. Photographs of the Test Set-Up

Photograph 1: Set-up for Radiated disturbance



Photograph 2: Set-up for Electrostatic Discharge



Photograph 3: Set-up for Radio Frequency Electromagnetic Field



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-- The END --