

EMC Test Report



China

Applicant: Changzhou Bisek Cycle Co.,LTD

Product: PEDELEC

Model: BSKS16



Add value.
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In accordance with EN 15194

Prepared for: Changzhou Bisek Cycle Co.,LTD
Hanjiang west road #118, Xinbei District, 213000 Changzhou city, Jiangsu,
PEOPLE'S REPUBLIC OF CHINA

COMMERCIAL-IN-CONFIDENCE

Report Number: 4830020236000

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
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Prepared By	Xiaowei Wang		02.06.2020

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with Clause 4.2.15 of EN 15194:2017.

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	02/06/2020

1.2 Introduction

The information contained in this report is intended to show verification of the EMC Qualification Approval Testing of the requirements of the standards for the tests listed in Section 1.3.

Applicant	Changzhou Bisek Cycle Co.,LTD
address	Hanjiang west road #118,Xinbei District, 213000 Changzhou city,Jiangsu, PEOPLE'S REPUBLIC OF CHINA
Manufacturer	Changzhou Bisek Cycle Co.,LTD
address	Hanjiang west road #118,Xinbei District, 213000 Changzhou city,Jiangsu, PEOPLE'S REPUBLIC OF CHINA
Factory	Changzhou Bisek Cycle Co.,LTD
Model Number(s)	BSKS16
Rated input voltage	DC 36V
Number of Samples Tested	1
Test Specification	EN 15194:2017 Clause 4.2.15
Date of Receipt of EUT	20/03/2020
Start of Test	20/03/2020
Finish of Test	07/04/2020
Name of Engineer(s)	Xiaowei Wang



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with EN 15194 is shown below.

Section	Specification	Clause	Test Description	Result	Comments/Base Standard
Battery Powered / Running					
2.1	EN 15194:2017	Annex C.1.2. 2 & C.1.2. 3	Radiated Disturbance	Pass	
2.2	EN 15194:2017	Annex C.8	Electrostatic discharge immunity test	Pass	EN 61000-4-2
2.3	EN 15194:2017	Annex C.1.2. 4	Vehicle immunity to electromagnetic radiation	Pass	ISO 11451-1



1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT) is pedelec. Electrically power assisted cycle, equipped with pedals and an auxiliary electric motor, which cannot be propelled exclusively by means of this auxiliary electric motor.

1.4.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Battery Powered				
Enclosure port	--	--	--	no

1.4.3 Test Configuration

Configuration	Description
Battery Powered	36V DC

1.4.4 Modes of Operation

Mode	Description
Running	Apply a load in order to achieve 75% continuous rated power; 90% of the "start up assistance mode"; 90% of the design maximum assistance speed.
Power on	standstill mode.

1.4.5 Monitoring of Performance

The EUT works normally, 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.

1.4.6 Performance Criteria

Vehicle immunity to electromagnetic radiation

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.

Electrostatic discharge immunity test

Performance criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonable expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however no change of actual operating state or stored data is allowed to persist after test. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonable expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instruction for use.

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.



1.6 Test Location

Site 1:

TÜV SÜD Product Service conducted the following tests at TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai EMC Lab.

Address:

No.16, Lane 1951,
Duhui Road
Shanghai
201108
China

Site 2:

Shanghai Institute of Process Automation & Instrumentation

Address:

103 Caobao Road, Shanghai
200233
China

Test Name	Name of Engineer(s)
DC Powered	
Radiated Disturbance	Huali Cheng
Electrostatic discharge immunity test	Huali Cheng
Vehicle immunity to electromagnetic radiation	Huali Cheng

2 Test Details

2.1 Radiated Disturbance

2.1.1 Specification Reference

EN 15194:2017, Clause Annex C.1.2.2 & C.1.2.3

2.1.2 Equipment Under Test

BSKS16

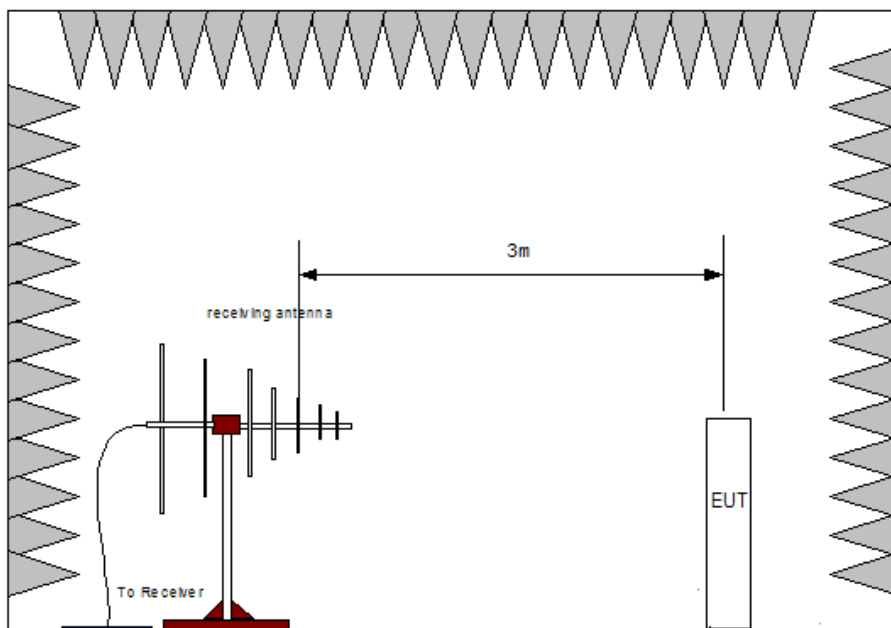
2.1.3 Date of Test

07/04/2020

2.1.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a reference ground plane, the center of the antenna shall be $1.8\text{m} \pm 0.05\text{m}$ above the ground. A prescan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector; measurements were taken at a 3m distance. The EUT was then formally measured using a Quasi-Peak detector to measure broad-band electromagnetic radiation and using an average-value detector to measure narrow-band electromagnetic radiation.

Apply a load in order to test at $75\% \pm 10\%$ of the continuous rated declared by the manufacturer.



2.1.5 Environmental Conditions

Ambient Temperature	20.5°C
Relative Humidity	41.1 %
Atmospheric Pressure	1031 mbar

2.1.6 Specification Limits

Electromagnetic radiation emissions reference limits					
Value	Band-width	Antenna distance	Equation for L [dB(μ V/m)] within f[MHz]		
			30...75	75...400	400...1000
Mean value	Narrow-band	3 \pm 0.05m	34	34+15,13log(f/75)	45
Quasi-peak	Broad-band	3 \pm 0.05m	44	44+15,13log(f/75)	55

2.1.7 Test Results

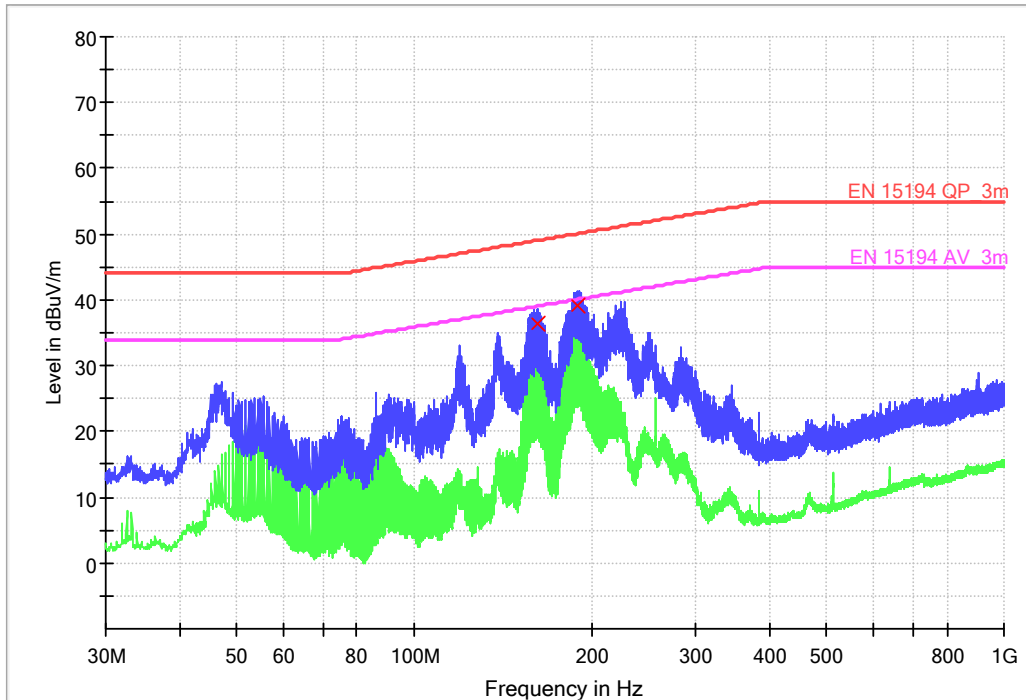
Results for Configuration and Mode: Battery Powered/Running

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Apply a load in order to achieve 75% continuous rated power.
 Frequency Range of Test: 30 MHz to 1 GHz

RE_VULB9168_max

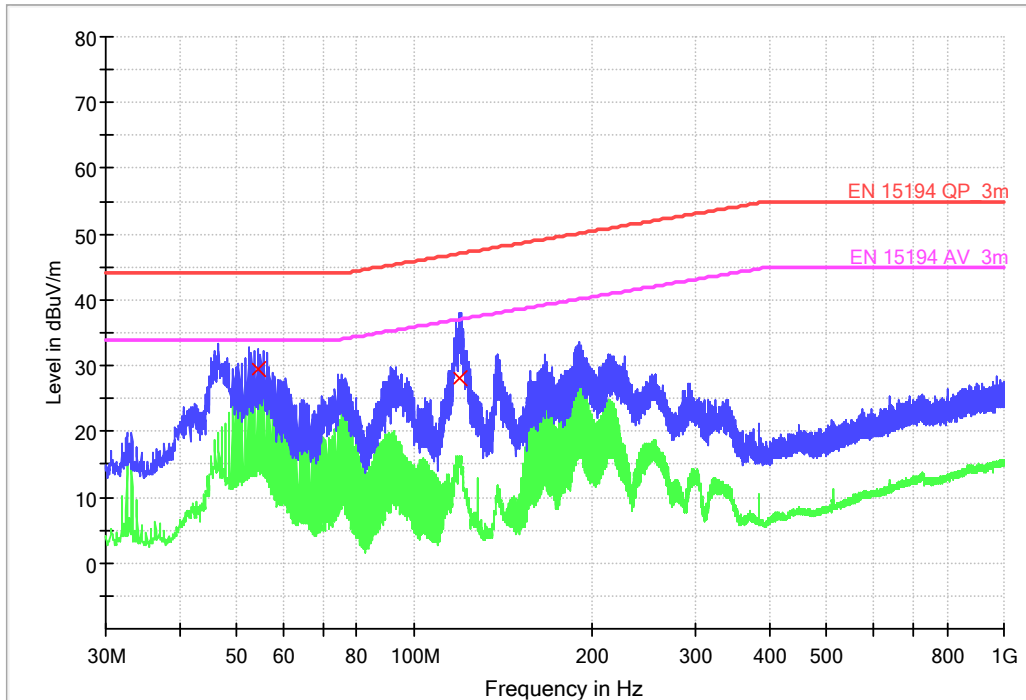


Graphical Results - Horizontal Polarity

Frequency (MHz)	QuasiPeak (dBuV/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
162.320000	36.3	12.7	49.1
188.600000	39.1	11.0	50.1

Apply a load in order to achieve 75% continuous rated power.
 Frequency Range of Test: 30 MHz to 1 GHz

RE_VULB9168_max



Graphical Results - Vertical Polarity

Frequency (MHz)	QuasiPeak (dBuV/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
54.280000	29.4	14.6	44.0
119.440000	28.2	18.8	47.1



Test Setup

2.1.8 Test Location

This test was carried out in 3m anechoic chamber of TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai EMC Lab.

2.2 Electrostatic discharge immunity test

2.2.1 Specification Reference

EN 15194:2017, Clause Annex C.8

2.2.2 Equipment Under Test

BSKS16

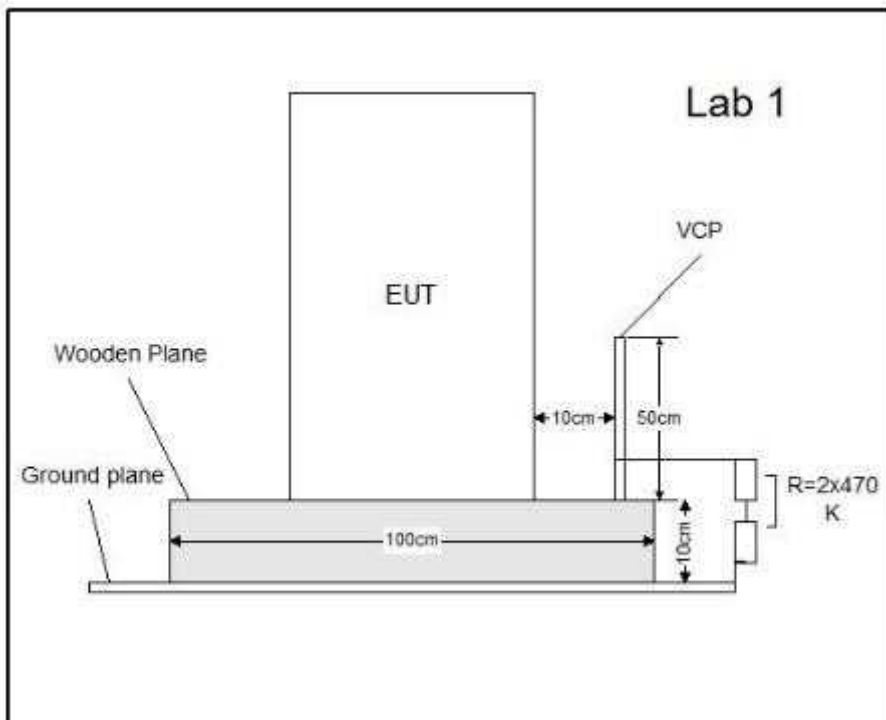
2.2.3 Date of Test

07/04/2020

2.2.4 Test Method

Using the air discharge method for non-metallic parts, contact discharge method for metallic parts with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, the required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repartition rate.

During this testing any anomalies in the equipment under tests performance was recorded.



2.2.5 Environmental Conditions

Ambient Temperature 20.5°C
 Relative Humidity 41.1 %
 Atmospheric Pressure 1031 mbar

2.2.6 Specification Limits

Required Test Levels	Performance
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Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)	Criteria
	Positive	Negative		
Air – Direct	2, 4 and 8	2, 4 and 8	<10>	B
Contact – Direct	2 and 4	2 and 4	<10>	B
Contact – Indirect	2 and 4	2 and 4	<10>	B

2.2.7 Test Results

Results for Configuration and Mode: Battery Powered/Running

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

ID	Test Point	Discharge	Results									
			2kV		4kV		6kV		8kV		15kV	
			+	-	+	-	+	-	+	-	+	-
	VCP	Contact	✓	✓	✓	✓						
	Metal Enclosure	Contact	✓	✓	✓	✓						
	Screw	Contact	✓	✓	✓	✓						
	Plastic Enclosure	Air	✓	✓	✓	✓			✓	✓		

Key to Results	
✓	The EUTs performance was not impacted when the ESD pulse was applied.
✓*	No discharge occurred at this point when the ESD pulse was applied
Ox	
Fx	
N/A	Not Appliance



Test Setup

2.2.8 Test Location

This test was carried out in Immunity room of TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai EMC Lab.

2.3 Vehicle immunity to electromagnetic radiation

2.3.1 Specification Reference

EN 15194:2017, Clause Annex C.1.2.4

2.3.2 Equipment Under Test

BSKS16

2.3.3 Date of Test

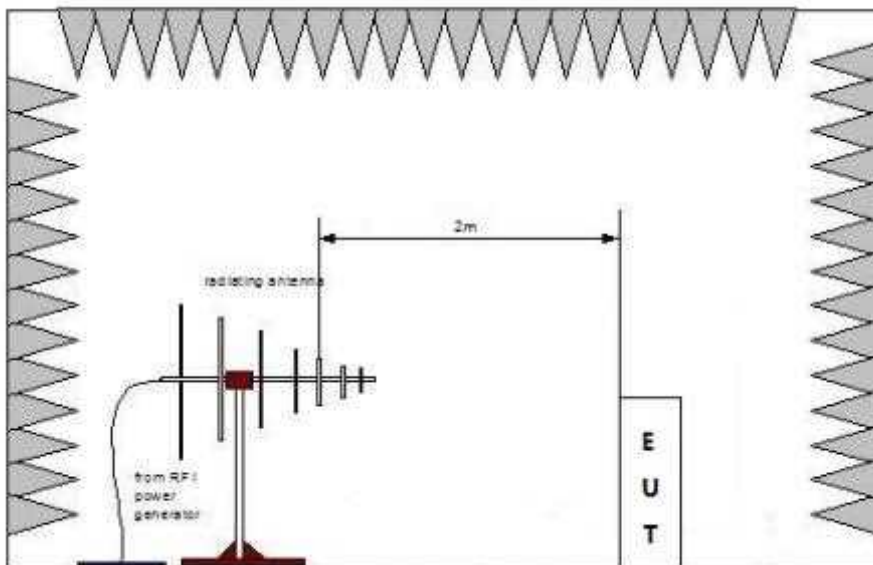
07/04/2020

2.3.4 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment; with a pre-calibrated semi anechoic chamber.

All four sides of the equipment under test were subjected to the required RF field strength, modulated as described, swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarizations.

During this testing any anomalies in the equipment under tests performance was recorded.



2.3.5 Environmental Conditions

Ambient Temperature 20.5°C
 Relative Humidity 41.1 %
 Atmospheric Pressure 1031 mbar

2.3.6 Specification Limits

Required Test Levels					Performance Criteria
Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	



20 to 2000	30	AM (80 %,1 kHz, sine wave)	1	2	A
Supplementary information: EUT powered at one of the Nominal input voltages and frequencies					

2.3.7 Test Results

Results for Configuration and Mode: Battery Powered/Running/Power on

Performance assessment of the EUT made during this test: *Pass*.

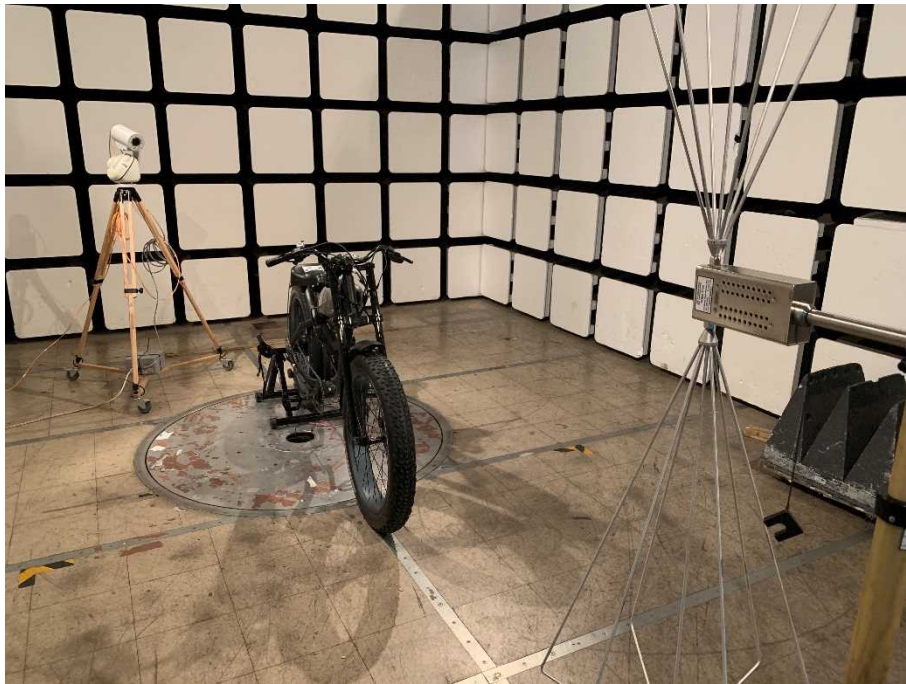
Detailed results are shown below.

Running, 90% of the design maximum assistance speed.

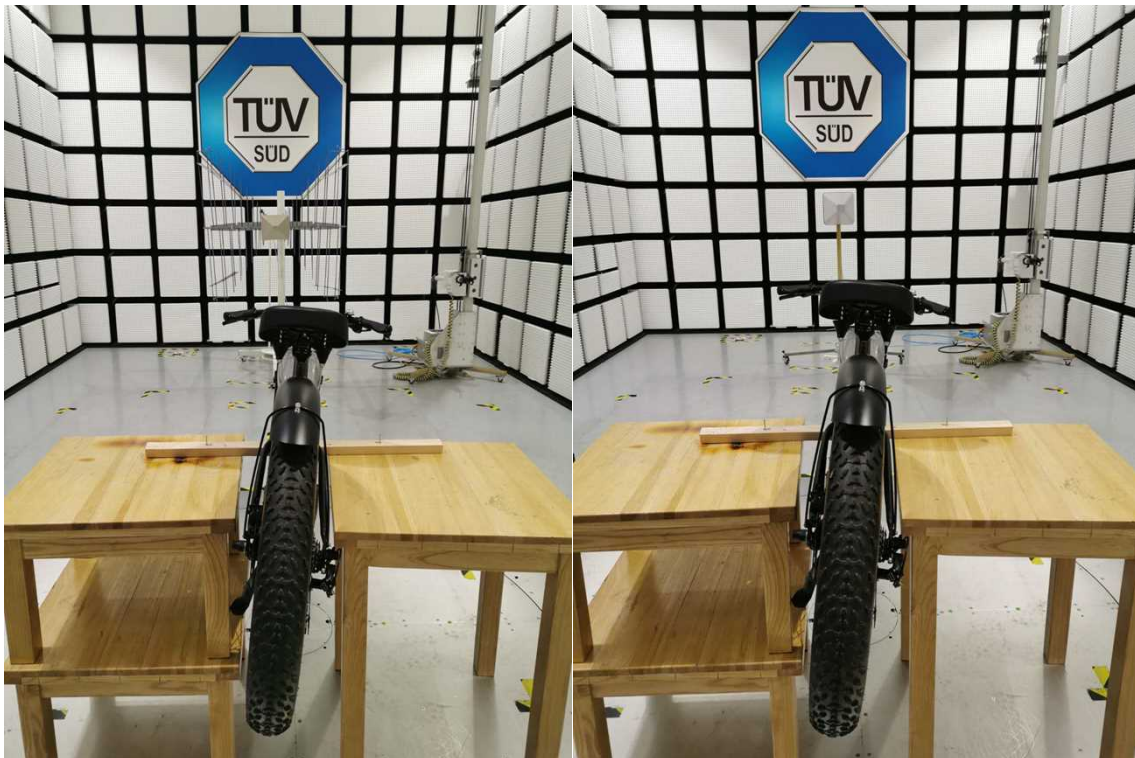
Running, 90% of the “start up assistance mode”.

Power on, standstill mode.

Tabulated Results for RF Electromagnetic Field 20-2000 MHz						
Side of the equipment under test	Antenna polarization	Test Level	step	Dwell Time	modulation	Result
Front,Rear	Vertical	30 V/m	1%	2 s	1KHZ SINE 80% AM	Pass PC A



Test Setup(20-80MHz)



Test Setup(80-2000MHz)

2.3.8 Test Location

This test (80-2000MHz) was carried out in 3m anechoic chamber of TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai EMC Lab.



This test (20-80MHz) was carried out in 3m anechoic chamber of Shanghai Institute of Process Automation & Instrumentation.



3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Date	Calibration Due
Radiated Emissions (Electric Field)					
EMI test receiver	ESR3	R&S	S1503109-YQ-EMC	2019/08/05	2020/08/04
Trilog super broadband test antenna	VULB 9163	SCHWARZ BECK	S1503008-YQ-EMC	2018/09/18	2021/09/17
3 meter semi-anechoic chamber	3m	TDK	S1503231-YQ-EMC	2018/05/11	2021/05/10
Immunity					
Vertical Coupling Plane	---	TÜV Product Service	---	---	---
T/H record	ZJ1-2A	Shanghai meteorological instrument	S1503201-YQ-EMC	2019/08/13	2020/08/12
ESD Simulator	ONYX 16	HAEFELY	S1705298-YQ-EMC	2019/08/05	2020/08/04
Signal generator	SMB 100A	R&S	S1503055-YQ-EMC	2019/08/05	2020/08/04
Power meter	NRP2	R&S	S1503062-YQ-EMC	2019/08/05	2020/08/04
Wideband power sensor	NRP-Z81	R&S	S1503097-YQ-EMC	2019/08/05	2020/08/04
Wideband power sensor	NRP-Z81	R&S	S1503098-YQ-EMC	2019/08/05	2020/08/04
Amplifier	1000W1000EM1	AR	S1503076-YQ-EMC	2019/08/05	2020/08/04
Amplifier	125S1G4	AR	S1503078-YQ-EMC	2019/08/05	2020/08/04
Dual directional coupler	DC6280AM1	AR	S1503077-YQ-EMC	2019/08/05	2020/08/04
Dual directional coupler	DC7144A	AR	S1503079-YQ-EMC	2019/08/05	2020/08/04
High gain log-periodic antenna	HL046E	R&S	S1503083-SB-EMC	NA	NA
Stacked double log-per antenna	STLP 9149	SCHWARZ BECK	S1503082-SB-EMC	NA	NA
3m Semi-Anechoic Chamber	07'x08'-4	LINDGREN	SIPAI/T-J07001	2018/07/08	2021/07/07
Signal generator	SMC 100A	R&S	SIPAI/T-J07122	2019/10/17	2020/10/16
Power meter	NRP2	R&S	SIPAI/T-J07124	2019/11/30	2020/11/29
Biconical Antenna	VHBD 9134+ BBFA 9136	SCHWARZ BECK	SIPAI/T-G07066	2020/04/07	2022/04/06
Power Amplifier	BSA0110-1200	BONN	SIPAI/T-J07120	2019/12/12	2020/12/11



4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Radiated Disturbance	30MHz to 1GHz, $\pm 3.88\text{dB}$
Electrostatic discharge immunity test	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2
Vehicle immunity to electromagnetic radiation	10 MHz to 6 GHz Test Amplitude $\pm 2.0\text{ dB}$

5 Photographs



