

EMC Test Report

Applicant: Changzhou Bisek Cycle Co.,LTD

Product: PEDELEC

Model: BSKS02, BSKS05



China



Add value.
Inspire trust.

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: 4830020291500

| RESPONSIBLE FOR | NAME | SIGNATURE | DATE |
|-----------------|--------------|--|--------------|
| Approved By | Jun Bao |  | 2020. 09. 04 |
| Prepared By | Xiaowei Wang |  | 2020. 09. 04 |

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 EN 15194:2017 Clause 4.2.15.

DISCLAIMER AND COPYRIGHT

This non-binding report has been prepared by TÜV SÜD Product Service with all reasonable skill and care. The reports apply only to the specific samples tested under stated test conditions. The document is confidential to the potential Client and TÜV SÜD Product Service. No part of this document may be reproduced without the prior written approval of TÜV SÜD Product Service.

TÜV SÜD Certification and Testing
(China) Co., Ltd.

No.10 Huaxia Road (M), Dongting,
Wuxi, 214100
P.R.China

Phone: +86 510 8820 3737
Fax: +86 510 8820 3636
www.tuv-sud.cn

ID Number: EMC_WUX_F_25.43E
Revision:01
Effective:2019-06-25





Contents

| | | |
|----------|--|-----------|
| 1 | Report Summary | 3 |
| 1.1 | Report Modification Record..... | 3 |
| 1.2 | Introduction..... | 3 |
| 1.3 | Brief Summary of Results | 4 |
| 1.4 | Product Information | 5 |
| 1.5 | Deviations from the Standard..... | 6 |
| 1.6 | Test Location | 6 |
| 2 | Test Details | 8 |
| 2.1 | Radiated Disturbance..... | 8 |
| 2.2 | Electrostatic discharge immunity test..... | 15 |
| 2.3 | Vehicle immunity to electromagnetic radiation..... | 18 |
| 3 | Test Equipment Information | 22 |
| 3.1 | General Test Equipment Used..... | 22 |
| 4 | Measurement Uncertainty | 24 |
| 5 | Photographs | 25 |

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 | 03/09/2020 |

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) | BSKS02, BSKS05 |
| Rated input voltage | DC 36V |
| Sample(s) Tested | BSKS02 |
| Sample No. | SHA-509188-1 |
| Test Specification | EN 15194:2017 Clause 4.2.15 |
| Date of Receipt of EUT | 12/08/2020 |
| Start of Test | 12/08/2020 |
| Finish of Test | 14/08/2020 |
| Name of Engineer(s) | Xiaowei Wang, Huali Cheng |

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 a 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.

All models have the same electric structure and same general layout of the electrical components. So model BSKS02 was performed the whole tests.

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 |
|---------------|-------------------------|
| 1 | Battery Powered. 36V DC |

1.4.4 Modes of Operation

| Mode | Description |
|------|---|
| 1 | Running. Apply a load in order to achieve 75% continuous rated power. |
| 2 | Running. 90% of the "start up assistance mode". |
| 3 | Running. 90% of the design maximum assistance speed. |
| 4 | 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:

All tests other than Vehicle immunity test to electromagnetic radiation (20-80MHz) conducted the following table were performed at TÜV SÜD Certification and Testing Co., Ltd. Shanghai EMC Lab.

Address:

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

Site 2:

Vehicle immunity test to electromagnetic radiation (20-80MHz) conducted the following table were performed at Shanghai Institute of Process Automation & Instrumentation.

Address:

103 Caobao Road, Shanghai
200233
China

| Test Name | Name of Engineer(s) |
|---|---------------------|
| Battery 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

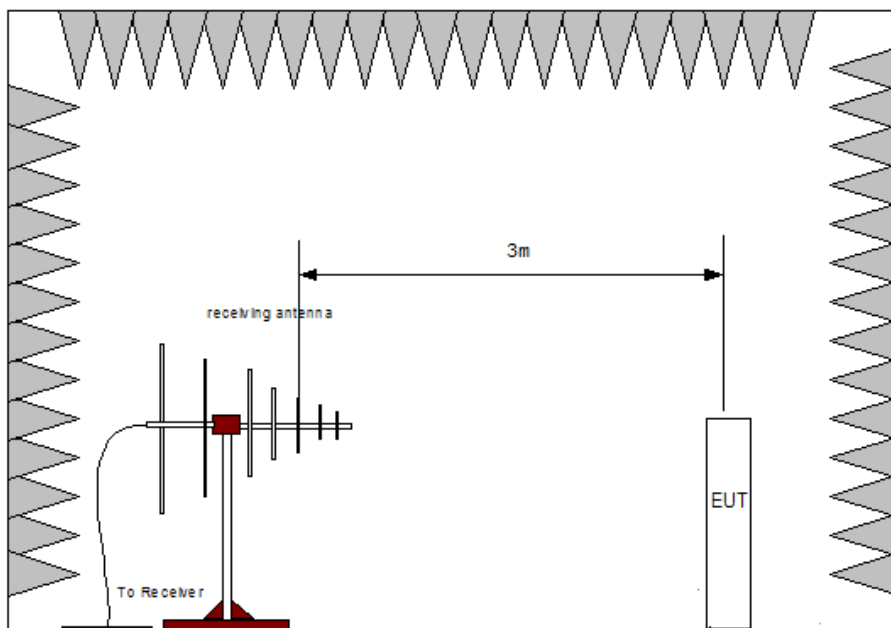
BSKS02

2.1.3 Date of Test

12/08/2020

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 | 21.5°C |
| Relative Humidity | 49.8 % |
| 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: Configuration 1/ Mode 1.

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

Detailed results are shown below.



30-1000MHz Radiated Disturbance Test

EUT Information

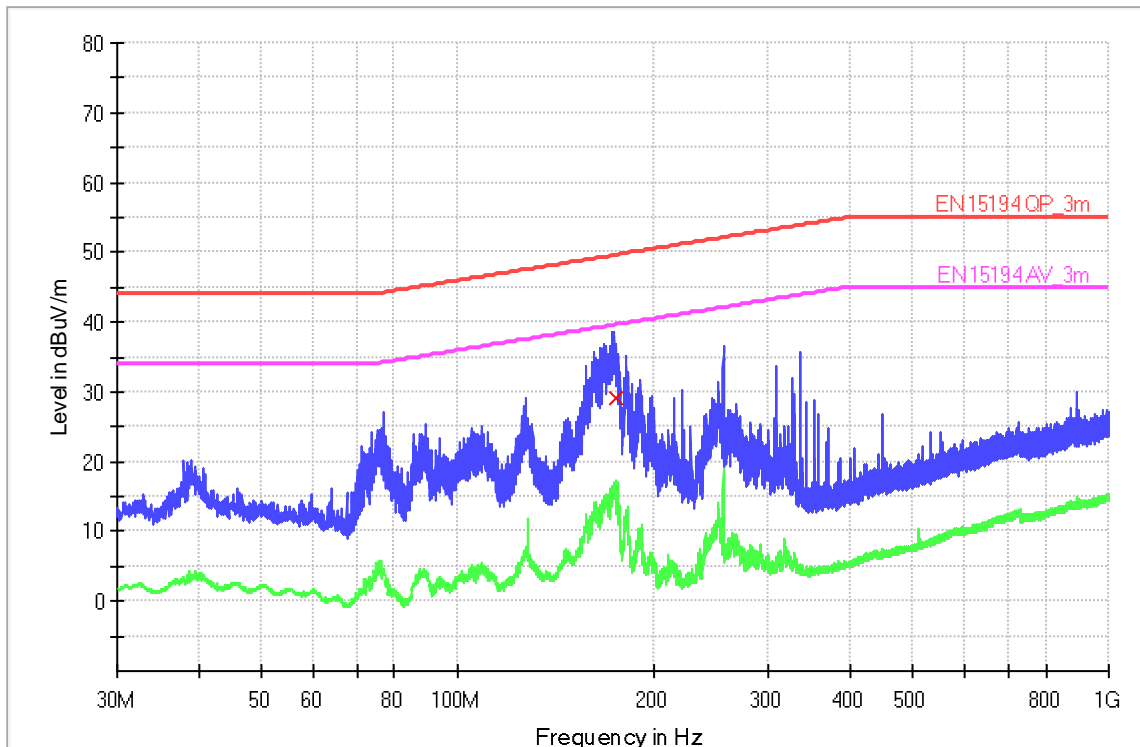
EUT Name: PEDLEC
 Model: BSKS02
 Client: CHANGZHOU BISEK CYCLE CO., LTD.
 Op Cond: Power on, DC 36V, 21.5, H49.8%, P103.1kPa
 Operator: Cheng huali
 Test Spec: EN 15194
 Comment: Horizontal
 Sample No: SHA-509188-1

Scan Setup: RE_VULB9168_max [EMI radiated]

Hardware Setup: RE_VULB9168
 Receiver: [ESR 3]
 Level Unit: dBuV/m

| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 1 GHz | 40 kHz | PK+; AVG | 120 kHz | 0.005 s | 20 dB |

RE_VULB9168_max





Limit and Margin

| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBuV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 174.920000 | 29.0 | 1000.0 | 120.000 | 179.7 | H | 0.0 | 14.1 | 20.6 | 49.6 |



30-1000MHz Radiated Disturbance Test

EUT Information

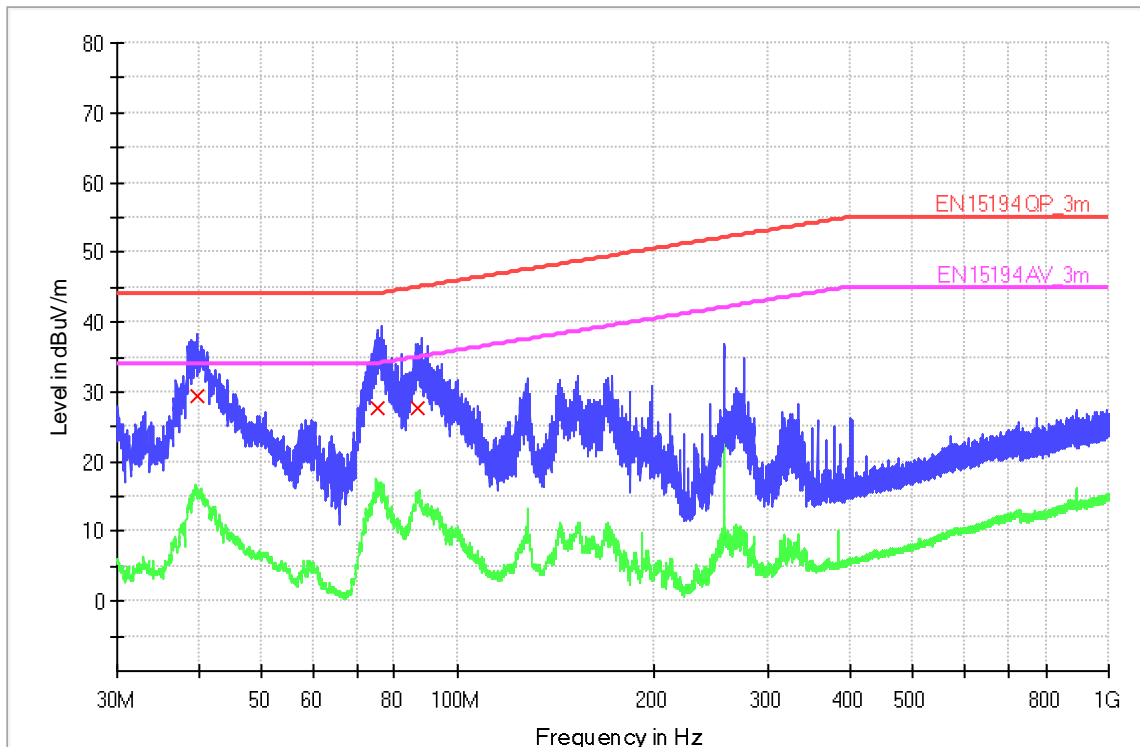
EUT Name: PEDELEC
 Model: BSKS02
 Client: CHANGZHOU BISEK CYCLE CO., LTD.
 Op Cond: Power on, DC 36V, 21.5, H49.8%, P103.1kPa
 Operator: Cheng huali
 Test Spec: EN 15194
 Comment: Vertical
 Sample No: SHA-509188-1

Scan Setup: RE_VULB9168_max [EMI radiated]

Hardware Setup: RE_VULB9168
 Receiver: [ESR 3]
 Level Unit: dBuV/m

| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 1 GHz | 40 kHz | PK+; AVG | 120 kHz | 0.005 s | 20 dB |

RE_VULB9168_max



Limit and Margin

| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBuV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 39.840000 | 29.5 | 1000.0 | 120.000 | 179.7 | V | 359.0 | 14.7 | 14.5 | 44.0 |
| 75.440000 | 27.8 | 1000.0 | 120.000 | 179.7 | V | 2.0 | 11.0 | 16.3 | 44.0 |
| 87.000000 | 27.6 | 1000.0 | 120.000 | 179.7 | V | 359.0 | 10.5 | 17.3 | 45.0 |



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

BSKS02

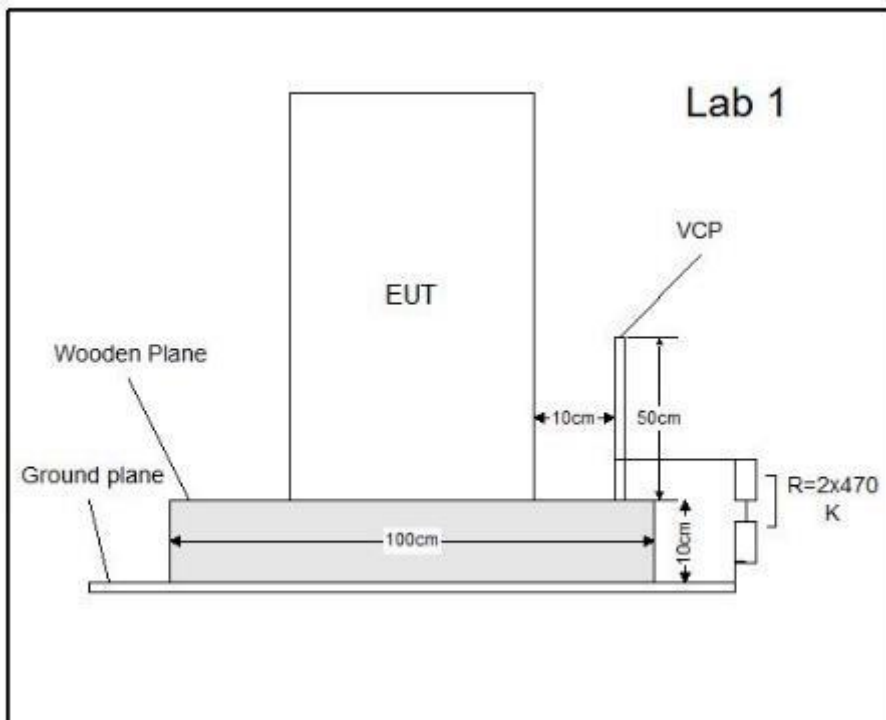
2.2.3 Date of Test

12/08/2020

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 | 22.0°C |
| Relative Humidity | 48.3 % |
| Atmospheric Pressure | 1031 mbar |



2.2.6 Specification Limits

| Required Test Levels | | | | Performance Criteria |
|----------------------|----------------------|------------|---|----------------------|
| Discharge type | Discharge Level (kV) | | Number of discharges per location (each polarity) | |
| | 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: Configuration 1/ Mode 2,3,4.

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

BSKS02

2.3.3 Date of Test

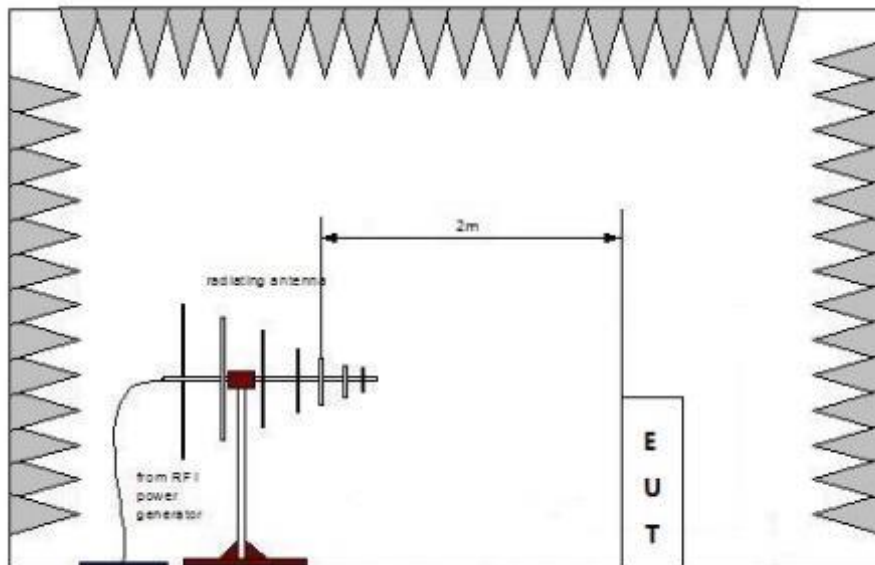
12/08/2020&14/08/2020

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 | 22.0°C |
| Relative Humidity | 48.3 % |
| 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: Configuration 1/ Mode 2,3,4.

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

Detailed results are shown below.

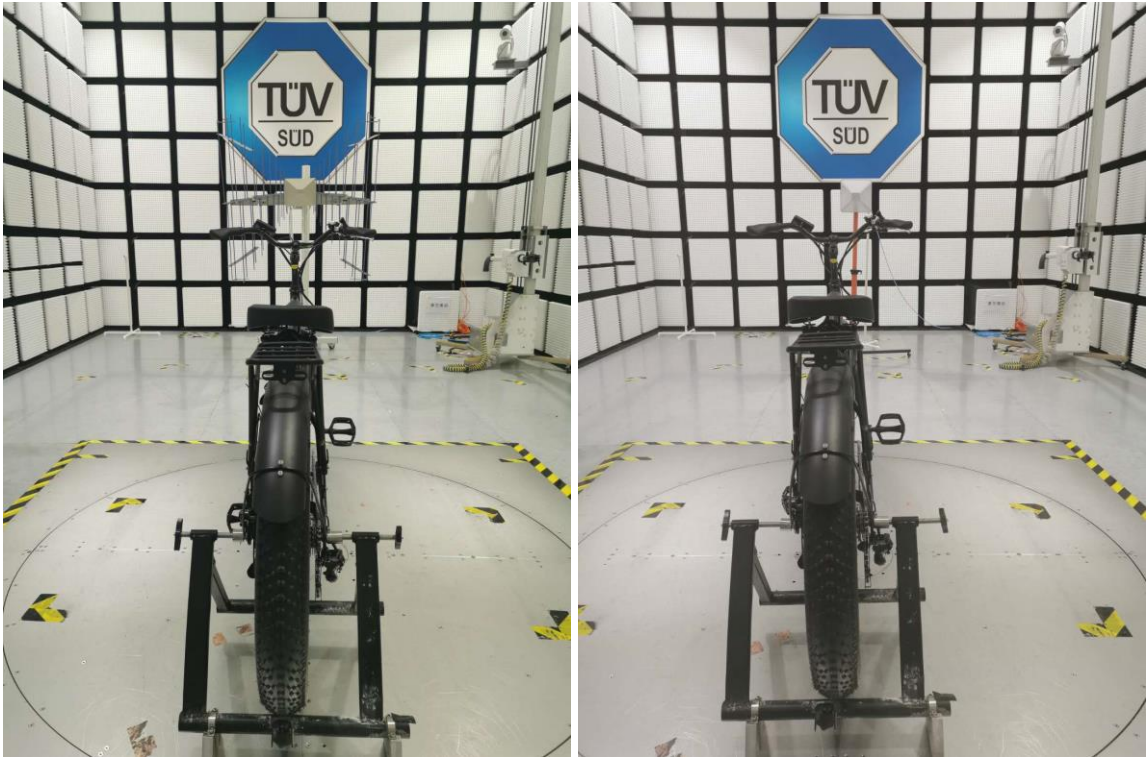
Running, 90% of the design maximum assistance speed.

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 | 2020/08/05 | 2021/08/03 |
| Trilog super broadband test antenna | VULB 9163 | SCHWARZBECK | S1503008-YQ-EMC | 2018/06/11 | 2021/06/10 |
| 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 | 2020/08/13 | 2021/08/12 |
| ESD Simulator | ONYX 16 | HAEFELY | S1705298-YQ-EMC | 2020/07/10 | 2021/07/09 |
| Signal generator | SMB 100A | R&S | S1503055-YQ-EMC | 2020/08/04 | 2021/08/03 |
| Power meter | NRP2 | R&S | S1503062-YQ-EMC | 2020/08/04 | 2021/08/03 |
| Wideband power sensor | NRP-Z81 | R&S | S1503097-YQ-EMC | 2020/08/04 | 2021/08/03 |
| Wideband power sensor | NRP-Z81 | R&S | S1503098-YQ-EMC | 2020/08/04 | 2021/08/03 |
| Amplifier | 1000W1000EM1 | AR | S1503076-YQ-EMC | 2020/08/04 | 2021/08/03 |
| Amplifier | 125S1G4 | AR | S1503078-YQ-EMC | 2020/08/04 | 2021/08/03 |
| Dual directional coupler | DC6280AM1 | AR | S1503077-YQ-EMC | 2020/08/04 | 2021/08/03 |
| Dual directional coupler | DC7144A | AR | S1503079-YQ-EMC | 2020/08/04 | 2021/08/03 |
| High gain log-periodic antenna | HL046E | R&S | S1503083-SB-EMC | NA | NA |
| Stacked double log-per antenna | STLP 9149 | SCHWARZBECK | S1503082-SB-EMC | NA | NA |
| 3m Semi-Anechoic Chamber | 07'x08'-4 | LINDGREN | SIPAI/T-J07001 | 2018/07/08 | 2021/07/07 |

| Instrument | Manufacturer | Type No | TE No | Calibration Date | Calibration Due |
|-------------------|----------------------|-------------|----------------|------------------|-----------------|
| Immunity | | | | | |
| 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 | SCHWARZBECK | SIPAI/T-G07066 | 2020/04/07 | 2022/04/06 |
| Biconical Antenna | VHBD 9134+ BBFA 9136 | SCHWARZBECK | 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, ± 3.88 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 ± 2.0 dB |

5 Photographs







China





