# Technical Construction File

## EN IEC 62368-1:2020

## Audio/video, information and communication technology equipment. Safety requirements

| | |
|---|---|
| TCF Reference No..... : | TRZJ21011228835 |
| Prepared by (+ signature)..... : | ..... |
| | Stephen Zhang / Testing Engineer |
| Approved by (+ signature)..... : | |
| | Cosco Yu / Technical Manager ..... |
| Date of issue..... : | January 19,2021 |
| The third party..... : | Shanghai Global Testing Services Co., Ltd. |
| Address..... : | Floor 2nd, Building D-1, No. 128, Shenfu Road, Minhang District, Shanghai, China. |
| Reviewing procedure ..... : | CE |
| Applicant's name..... : | ZHEJIANG IWALK TECHNOLOGY CO., LTD. |
| Address..... : | NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA |
| Manufacturer's name..... : | ZHEJIANG IWALK TECHNOLOGY CO., LTD. |
| Address..... : | NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA |
| Factory's name..... : | Same as manufacturer |
| Address..... : | Same as manufacturer |
| TCF specification: | |
| Standard..... : | ☒ EN IEC 62368-1:2020 |
| Non-standard TCF method…….. : | N/A |
| Review item description..... : | Electric Scooter |
| Trade Mark..... : | / |
| Model/Type reference..... : | KS1 |
| Ratings ( for the Electrical Equipment) …….. : | 100 ~240VAC/50~60Hz |
| Other information | N/A |

| | |
|---|---|
| **Review item particulars**( for the Electrical Equipment)..... : | |
| Classification of installation and use..... : | Stationary |
| Supply Connection..... : | Terminal |
| Electrical safety class..... : | / |
| IP number..... : | / |
| Switch..... : | Yes |
| Thermostat..... : | No |
| Thermal cut-out..... : | No |
| Electronic circuit..... : | Yes |
| Timer..... : | Yes |
| Heating elements..... : | No |
| Motor..... : | No |
| Low voltage motor..... : | No |
| Accessories provided..... : | Yes |
| Portable appliance..... : | No |
| Attachment type..... : | No |
| **Possible review case verdicts:** | |
| -review case does not apply to the test object..... : | N/A |
| - review object does meet the requirement..... : | P(Pass) |
| - review object does not meet the requirement..... : | F(Fail) |
| **Reviewing**..... : | |
| Date of receipt of review item..... : | January 12,2021 |
| Date (s) of performance of reviews..... : | January 12,2021 to January 19,2021 |

**General remarks:**

The review results presented in this report relate only to the object reviewed.
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"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

**General product information:**

Electric Scooter
KS1
Review condition:
Temperature: -40-70°C
Relative humidity: 60%
The review sample was a pre-production sample.

Copy of marking plate and summary of review results (information/comments):

| | |
|---|---|
| Electric Scooter<br><br>Model:<br>KS1<br><br>**ZHEJIANG IWALK TECHNOLOGY CO., LTD.** | CE |

**Summary of reviewing:**

-The reviewed sample is found to comply with EN IEC 62368-1:2020.

**General notes on tests:**

This review report include the following page(s):

National deviation of EU have been considered.

Annex I: Photo Documentation, 9 page(s).

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 1 | GENERAL | | P |
| 1.5 | Components | | P |
| 1.5.1 | Comply with IEC60 950 or relevant component standard | Components, which were found to affect safety aspects. comply with the requirements of this standard or within the safety aspects of the relevant IEC component standards (see appended table 1.5.1). | P |
| 1.5.2 | Evaluation and testing of components | | P |
| | Dimensions (mm) of mains plug for direct plug-in .: | | P |
| | Torque and pull test of mains plug for direct plug-in; torque (Nm); pull (N) | | P |
| 1.5.3 | Thermal controls | | N/A |
| 1.5.4 | Transformers | | N/A |
| 1.5.5 | Interconnecting cables | | P |
| 1.5.6 | Capacitors in primary circuits | | N/A |
| 1.5.7 | Double insulation or reinforced insulation bridged by components | | N/A |
| 1.5.7.2 | Bridging capacitors | | N/A |
| 1.5.7.3 | Bridging resistors | | N/A |
| 1.5.7.4 | Accessible parts | | N/A |
| 1.5.8 | Components in equipment for IT power distribution systems | | N/A |
| 1.5.9 | Surge suppressors | | P |
| 1.5.9.2 | Protection of VDRs | | N/A |
| 1.5.9.3 | Bridging of functional insulation by a VDR | | N/A |
| 1.5.9.4 | Bridging of basic insulation by a VDR | | N/A |
| 1.5.9.5 | Bridging of supplementary, double or reinforced insulation by a VDR | | N/A |
| 1.6 | Power interface | | P |
| 1.6.1 | AC power distribution systems | | P |
| 1.6.2 | Steady state input current | | N/A |
| | Current deviation during normal operating cycle | | N/A |
| 1.6.3 | Voltage limit of hand-held equipment | | N/A |
| 1.6.4 | Neutral conductor insulated from earth and body | | N/A |
| 1.7 | Marking and instructions | | P |
| 1.7.1 | Power rating | | P |
| | Multiple mains supply connections..... : | | N/A |
| | Rated voltages or ranges(V) .....: | / | P |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| | Symbol of nature of supply for d.c. ..... : | | P |
| | Rated frequency or ranges (Hz) .....: | / | P |
| | Rated current (A) .....: | / | N/A |
| | Manufacturer or trademark..... : | ZHEJIANG IWALK TECHNOLOGY CO., LTD. | P |
| | Type/model .....: | | P |
| | Symbol of Class II .....: | | P |
| | Other symbols .....: | | P |
| | Certification marks ..... : | | N/A |
| 1.7.2 | Safety instructions | | P |
| 1.7.2.1 | General | | N/A |
| 1.7.2.2 | Disconnect devices | | N/A |
| 1.7.2.3 | Overcurrent protective devices | | N/A |
| 1.7.2.4 | IT power distribution systems | | N/A |
| 1.7.2.5 | Operator access with a tool | | N/A |
| 1.7.2.6 | Ozone | | N/A |
| 1.7.3 | Short duty cycles | | N/A |
| 1.7.4 | Supply voltage adjustment .....: | | N/A |
| | Marking for voltage setting/frequency setting .....: | | N/A |
| 1.7.5 | Marking at power outlets .....: | | N/A |
| 1.7.6 | Fuse identification……..: | | N/A |
| 1.7.7 | Wiring terminals | | N/A |
| 1.7.7.1 | Protective earthing terminals and bonding terminals | | N/A |
| 1.7.7.2 | Terminals for a.c. mains supply conductors | | N/A |
| 1.7.7.3 | Terminals for d.c. mains supply conductors | | N/A |
| 1.7.8 | Controls and indicators | | N/A |
| 1.7.8.1 | Identification and location of switches and controls: | | N/A |
| 1.7.8.2 | Colours of controls and indicators .....: | | N/A |
| 1.7.8.3 | Symbols according to IEC 60417 .....: | | N/A |
| 1.7.8.4 | Figures used for marking ..... : | | N/A |
| 1.7.9 | Isolation of multiple power sources .....: | | N/A |
| 1.7.10 | IT power distribution systems.....: | | N/A |
| 1.7.11 | Thermostats and other regulating devices .....: | | N/A |
| 1.2.12 | Language .....: | Instructions in English | P |
| 1.7.13 | Durability | The marking plate has no curling and is not able to be removed easily. | P |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 1.7.14 | Removable parts | . | N/A |
| 1.7.15 | Replaceable batteries .....: | | P |
| | Language(s) .....: | | --- |
| 1.7.16 | Operator access with a tool.....: | | N/A |
| 1.7.17 | Equipment for restricted access locations.....: | | N/A |
| 2 | PROTECTION FROM HAZARDS | | P |
| 2.1 | Protection from electric shock and energy hazards | | P |
| 2.1.1 | Protection in operator access areas | | P |
| 2.1.1.1 | Access to energized parts | | P |
| | Test by inspection ..... : | | P |
| | Test with test finger .....: | | P |
| | Test with test pin ..... : | | P |
| | Test with test probe | | P |
| 2.1.1.2 | Battery compartments | | N/A |
| 2.1.1.3 | Insulation of internal wiring in an ELV circuit accessible to operator | | N/A |
| | Working voltage (V); distance (mm) through insulation ..... : | | N/A |
| 2.1.1.4 | Operator accessible insulation of internal wiring at hazardous voltage | | N/A |
| 2.1.1.5 | Energy hazards in operator access area | | N/A |
| 2.1.1.6 | Manual controls | | N/A |
| 2.1.1.7 | Discharge of capacitors in equipment | | N/A |
| | Marked or nominal capacitance (μF) | | --- |
| | Time constant (s) ; measured voltage (V) | | ---- |
| 2.1.1.8 | Energy hazards – d.c. mains supply | | N/A |
| | a) Capacitor connected to the d.c. mains supply ..: | | N/A |
| | b) Internal battery connected to the d.c. mains supply .....: | | N/A |
| 2.1.1.9 | Audio amplifiers .....: | No such compartments | N/A |
| 2.1.2 | Protection in service access areas | . | N/A |
| 2.1.3 | Protection in restricted access locations | | N/A |
| 2.2 | SELV circuits | | N/A |
| 2.2.1 | General requirements | | N/A |
| 2.2.2 | Voltage (V) of SELV circuits under normal operating conditions.....: | | N/A |
| 2.2.3 | Voltage (V) under single fault conditions | | N/A |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 2.2.3.1 | Separation by double insulation or reinforced insulation (Method 1) | | P |
| 2.2.3.2 | Separation by earthed screen (Method 2) | | N/A |
| 2.2.3.3 | Protection by earthing of the SELV circuit (Method 3) | | N/A |
| 2.2.4 | Connection of SELV circuits to other circuits | | N/A |
| 2.3 | TNV circuits | | N/A |
| 2.3.1 | Limits | | N/A |
| | Type of TNV circuits | | --- |
| 2.3.2 | Separation from other circuits and from accessible parts | | N/A |
| | Insulation solutions | | --- |
| 2.3.3 | Separation from hazardous voltages | | N/A |
| | Insulation solutions | | --- |
| 2.3.4 | Connection of TNV circuits to other circuits | | N/A |
| | Insulation solutions | | --- |
| 2.3.5 | Test for operating voltages generated externally (only carried out if specified in 2.3.2) | | N/A |
| 2.4 | Limited current circuits | | N/A |
| 2.4.1 | General requirements | | N/A |
| 2.4.2 | Limit values | | N/A |
| | Frequency (Hz) .....: | | --- |
| | Measured current (mA) ..... : | | --- |
| | Measured voltage (V) ..... : | | --- |
| | Measured capacitance (μF) .....: | | --- |
| 2.4.3 | Limited current circuit supplied from or connected to other circuits ..... : | | N/A |
| 2.5 | Limited power sources | | P |
| | Inherence limits the output | | P |
| | Impedance limits the output | | N/A |
| | Overcurrent protective device limits the output | | N/A |
| | Regulating network limits the output under normal operating conditions and single fault | | P |
| | Regulating network limits the output under normal operating conditions and overcurrent protective device limits the output under single fault | | N/A |
| | Output voltage (V), Output current (A), Apparent power (VA) | | --- |
| | Current rating of overcurrent protective device | | --- |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 2.6 | Provisions for earthing and bonding | | N/A |
| 2.6.1 | Protective earthing | | N/A |
| 2.6.2 | Functional earthing | | N/A |
| 2.6.3 | Protective earthing and protective bonding conductors | | N/A |
| 2.6.3.1 | General | | N/A |
| 2.6.3.2 | Size of protective earthing conductors | | N/A |
| | Rated current (A), cross-sectional area ($mm^2$), AWG.....: | | --- |
| 2.6.3.3 | Size of protective bonding conductors | | N/A |
| | Rated current (A), cross-sectional area ($mm^2$), AWG..... : | | --- |
| | Protective current rating (A), cross-sectional area ($mm^2$), AWG .....: | | --- |
| 2.6.3.4 | Resistance of earthing conductors and their terminations; resistance ( ), voltage drop (V), test current (A), duration (min) .....: | | P |
| 2.6.3.5 | Colour of insulation | | N/A |
| | The insulation of the protective earthing conductor shall be green-and-yellow. | | N/A |
| 2.6.4 | Terminals | | N/A |
| 2.6.4.1 | General | | N/A |
| 2.6.4.2 | Protective earthing and bonding terminals | | P |
| | Rated current (A), type, nominal thread diameter (mm) .....: | | --- |
| 2.6.4.3 | Separation of the protective earthing conductor from protective bonding conductors | | N/A |
| 2.6.5 | Integrity of protective earthing | | N/A |
| 2.6.5.1 | Interconnection of equipment | | N/A |
| 2.6.5.2 | Components in protective earthing conductors and protective bonding conductors | . | N/A |
| 2.6.5.3 | Disconnection of protective earth | | N/A |
| 2.6.5.4 | Parts that can be removed by an operator | | N/A |
| 2.6.5.5 | Parts removed during servicing | | N/A |
| 2.6.5.6 | Corrosion resistance | | N/A |
| 2.6.5.7 | Screws for protective bonding | | N/A |
| 2.6.5.8 | Reliance on telecommunication network or cable distribution system | | N/A |
| 2.7 | Overcurrent and earth fault protection in primary circuits | | N/A |
| 2.7.1 | Basic requirements | | N/A |

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|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| | Protective devices shall be included as parts of the equipment | | N/A |
| | Instructions of protection in the building installation | | N/A |
| 2.7.2 | void | | N/A |
| 2.7.3 | Short-circuit backup protection | | N/A |
| 2.7.4 | Number and location of protective devices | | N/A |
| 2.7.5 | Protection by several devices | | N/A |
| 2.7.6 | Warning to service persons | | N/A |
| 2.8 | Safety interlocks | | N/A |
| 2.8.1 | General principles | | N/A |
| 2.8.2 | Protection requirement | | N/A |
| 2.8.3 | Protection against inadvertent reactivation | | N/A |
| 2.8.4 | Reliability | | N/A |
| 2.8.5 | Moving parts | | N/A |
| 2.8.6 | Overriding an interlock | | N/A |
| 2.8.7 | Switches and relays | | N/A |
| 2.8.7.1 | Contact gap (mm) ..... : | | N/A |
| 2.8.7.2 | Overload test: switch performing 50 cycles | | N/A |
| 2.8.7.3 | Endurance test | | N/A |
| 2.8.7.4 | Electric strength test: test voltage (V) .....: | | N/A |
| 2.8.8 | Protection against mechanical actuators | | N/A |
| 2.9 | Electrical Insulation | | N/A |
| 2.9.1 | Properties of insulating materials | | N/A |
| 2.9.2 | Humidity treatment | | N/A |
| | Humidity (%) ..... : | | — |
| | Temperature (°C) ..... : | | — |
| 2.9.3 | Grade of insulation | | N/A |
| 2.10 | Separation from hazardous voltages | | N/A |
| | Method(s) used .....: | | --- |
| 2.10 | Clearances, creepage distances and distances through insulation | | N/A |
| | Nominal voltage (V) ..... : | | P |
| 2.10.1 | General | | P |
| 2.10.1.1 | Frequency .....: | | P |
| 2.10.1.2 | Pollution degrees .....: | | P |
| 2.10.1.3 | Reduced values for functional insulation | | P |
| 2.10.1.4 | Intervening unconnected conductive parts | | P |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 2.10.1.5 | Insulation with varying dimensions | | P |
| 2.10.1.6 | Special separation requirements | | P |
| 2.10.1.7 | Insulation in circuits generating starting pulses | | P |
| 2.10.2 | Determination of working voltage | | P |
| 2.10.2.1 | General | | P |
| 2.10.2.2 | RMS working voltage | | P |
| 2.10.2.3 | Peak working voltage | | P |
| 2.10.3 | Clearances | | P |
| 2.10.3.1 | General | | P |
| 2.10.3.2 | Mains transient voltages | | P |
| | a) AC mains supply .....: | | P |
| | b) Earthed d.c. mains supplies .....: | | P |
| | c) Unearthed d.c. mains supplies .....: | | P |
| | d) Battery operation .....: | | P |
| 2.10.3.3 | Clearances in primary circuits | | P |
| 2.10.3.4 | Clearances in secondary circuits | | P |
| 2.10.3.5 | Measurement of transient voltage levels | | P |
| 2.10.3.6 | Transients from a.c. mains supply .....: | | P |
| 2.10.3.7 | Transients from d.c. mains supply .....: | | P |
| 2.10.3.8 | Transients from telecommunication networks and cable distribution systems .....: | | P |
| 2.10.3.9 | Measurement of transient voltage levels | | P |
| | a) Transients from a mains supply | | P |
| | For an a.c. mains supply .....: | | P |
| | For a d.c. mains supply .....: | | P |
| | b) Transients from a telecommunication network : | | P |
| 2.10.4 | Creepage distances | | P |
| 2.10.4.1 | General | | P |
| 2.10.4.2 | Material group and comparative tracking index | | P |
| | CTI tests .....: | | -- |
| 2.10.4.3 | Minimum creepage distances | | P |
| 2.10.5 | Solid insulation | | N/A |
| 2.10.5.1 | General | | N/A |
| 2.10.5.2 | Distances through insulation | | N/A |
| 2.10.5.3 | Insulating compound as solid insulation | | N/A |
| 2.10.5.4 | Semiconductor devices | | N/A |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 2.10.5.5 | Cemented joints | | N/A |
| 2.10.5.6 | Thin sheet material – General | | N/A |
| 2.10.5.7 | Separable thin sheet material | | N/A |
| | Number of layers (pcs) .....: | | --- |
| 2.10.5.8 | Non-separable thin sheet material | | N/A |
| 2.10.5.9 | Thin sheet material – standard test procedure | | N/A |
| | Electric strength test | | --- |
| 2.10.5.10 | Thin sheet material – alternative test procedure | | N/A |
| | Electric strength test | | --- |
| 2.10.5.11 | Insulation in wound components | | N/A |
| 2.10.5.12 | Wire in wound components | | N/A |
| | Working voltage .....: | | N/A |
| | a) Basic insulation not under stress .....: | | N/A |
| | b) Basic, supplementary, reinforced insulation ....: | | N/A |
| | c) Compliance with Annex U .....: | | N/A |
| | Two wires in contact inside wound component; angle between 45 and 90 .....: | | N/A |
| 2.10.5.13 | Wire with solvent-based enamel in wound components | | N/A |
| | Electric strength test | | --- |
| | Routine test | | N/A |
| 2.10.5.14 | Additional insulation in wound components | | N/A |
| | Working voltage .....: | | N/A |
| | Basic insulation not under stress .....: | | N/A |
| | - Supplementary, reinforced insulation .....: | | N/A |
| 2.10.6 | Distances on coated printed boards | | N/A |
| 2.10.6.1 | Uncoated printed boards | | N/A |
| 2.10.6.2 | Coated printed boards | | N/A |
| 2.10.6.3 | Insulation between conductors on the same inner surface of a printed board | | N/A |
| 2.10.6.4 | Insulation between conductors on different layers of a printed board | | N/A |
| | Distance through insulation | | N/A |
| | Number of insulation layers (pcs) .....: | | N/A |
| 2.10.7 | Component external terminations | | N/A |
| 2.10.8 | Tests on coated printed boards and coated components | | N/A |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 2.10.8.1 | Sample preparation and preliminary inspection | | N/A |
| 2.10.8.2 | Thermal conditioning | | N/A |
| 2.10.8.3 | Electric strength test | | N/A |
| 2.10.8.4 | Abrasion resistance test | | N/A |
| 2.10.9 | Thermal cycling | | N/A |
| 2.10.10 | Test for Pollution Degree 1 environment and insulating compound | | N/A |
| 2.10.11 | Tests for semiconductor devices and cemented joints | | N/A |
| 2.10.12 | Enclosed and sealed parts | | N/A |
| 3 | WIRING, CONNECTIONS AND SUPPLY | | P |
| 3.1 | General | | P |
| 3.1.1 | Current rating and over-current protection | | P |
| 3.1.2 | Protection against mechanical damage | | P |
| 3.1.3 | Securing of internal wiring | | P |
| 3.1.4 | Insulation of conductors | | P |
| 3.1.5 | Beads and ceramic insulation (10N) | | N/A |
| 3.1.6 | Screws for electrical contact pressure | | N/A |
| 3.1.7 | Insulating materials in electrical connections not transmit contact pressure | | N/A |
| 3.1.8 | Self-tapping and spaced thread screws | | N/A |
| 3.1.9 | Termination of conductors | | N/A |
| | 10 N pull test | | N/A |
| 3.1.10 | Sleeving on wiring | | N/A |
| 3.2 | Connection to an a.c. mains supply or a d.c. mains supply | | N/A |
| 3.2.1 | Means of connection ..... : | | N/A |
| 3.2.1.1 | Connection to an a.c. mains supply | | N/A |
| 3.2.1.2 | Connection to a d.c. mains supply | | N/A |
| 3.2.2 | Design of product with more than one supply connection .....: | | N/A |
| 3.2.3 | Provision for permanent connection ..... : | | N/A |
| | Number of conductors, size (mm) of cables and conduits .....: | | --- |
| 3.2.4 | Appliance inlet | | N/A |
| 3.2.5 | Power supply cords | | N/A |
| 3.2.5.1 | AC power supply cords | | N/A |
| | Type and cross-sectional area (mm²) of power supply cord ……..: | | --- |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 3.2.5.2 | DC power supply cords | | N/A |
| 3.2.6 | Cord anchorages and strain relief | | N/A |
| | Test: 25 times; 1 s; pull (N) .....: | | N/A |
| | Electric strength test (reinforced insulation) | | N/A |
| | Longitudinal displacement ≤ 2 mm .....: | | --- |
| 3.2.7 | Protection against mechanical damage | | N/A |
| | Power supply cords shall not be exposed to sharp points or cutting edges. | | N/A |
| 3.2.8 | Cord guards | | N/A |
| | D (mm) .....: | | --- |
| | Test: mass (g) .....: | | --- |
| | Radius of curvature of the cord ≤ 1,5 D | | N/A |
| 3.2.9 | Supply wiring space | | N/A |
| 3.3 | Wiring terminals for connection of external conductors | | N/A |
| 3.3.1 | Wiring terminals | | N/A |
| 3.3.2 | Connection of non-detachable power supply cord | | N/A |
| 3.3.3 | Screws terminals | | N/A |
| 3.3.4 | Conductor sizes to be connected | | N/A |
| | Rated current (A), type of flexible cords or cables, cross-sectional area ($mm^2$) | | N/A |
| 3.3.5 | Size of wiring terminals | | N/A |
| 3.3.6 | Wiring terminal design | | N/A |
| 3.3.7 | Grouping of wiring terminals | | N/A |
| | AC mains supply terminals | | N/A |
| | DC mains supply terminals | | N/A |
| 3.3.8 | Stranded wire | | N/A |
| | Test with 8 mm stranded wire | | N/A |
| 3.4 | Disconnection from the mains supply | | N/A |
| 3.4.1 | General requirements | | N/A |
| 3.4.2 | Type of disconnect device ..... : | | N/A |
| 3.4.3 | Disconnect device in permanently connected equipment | | N/A |
| 3.4.4 | Parts of disconnect device which remain energized | | N/A |
| 3.4.5 | Switches in flexible cords | | N/A |
| 3.4.6 | Single-phase and d.c. equipment | | N/A |
| | Disconnection of both poles simultaneously in single- phase and d.c. equipment | | N/A |

| EN 62368-1 | | | |
|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 3.4.7 | Disconnection of all phase conductors of supply in three- phase equipment | | N/A |
| 3.4.8 | Marking of switch acting as disconnect device | | N/A |
| 3.4.9 | Installation instructions if plug on power supply cord acts as disconnect device | | N/A |
| 3.4.10 | Interconnected equipment | | N/A |
| 3.4.11 | Multiple power sources | | N/A |
| 3.5 | Interconnection of equipment | | P |
| 3.5.1 | General requirements | | P |
| 3.5.2 | Types of interconnection circuits | | P |
| 3.5.3 | ELV circuits as interconnection circuits | | N/A |
| 3.5.4 | Data ports for additional equipment | | N/A |
| 4 | PHYSICAL REQUIREMENTS | | P |
| 4.1 | Stability | | P |
| | Angle of 10° | | P |
| | Test: force (N) .....: | | N/A |
| 4.2 | Mechanical strength | | P |
| 4.2.1 | General | | P |
| 4.2.2 | Steady force test, 10N±1N | | P |
| 4.2.3 | Steady force test, 30 N ± 3 N; 5 s | | N/A |
| 4.2.4 | Steady force test, 250 N ± 10 N; 5 s | | P |
| 4.2.5 | Steel ball impact tests (50mm, 500g± 25g) | | N/A |
| | Fall test | | N/A |
| | Swing test | | N/A |
| 4.2.6 | Drop test | | N/A |
| 4.2.7 | Stress relief test | | P |
| | Heat test for enclosures of moulded or formed thermoplastic materials: 7 h; T (°C) ..... : | | N/A |
| 4.2.8 | Mechanical strength of cathode ray tubes | | N/A |
| | Cathode ray tube separately approved | | N/A |
| 4.2.9 | High pressure lamps | | N/A |
| 4.2.10 | Wall or ceiling mounted equipment | | N/A |
| 4.3 | Design and construction | | P |
| 4.3.1 | Edges and corners shall be rounded or smoothed. | | P |
| 4.3.2 | Handles and manual controls | | N/A |
| | Axial pull test: 1min, pull (N)……..: | | N/A |
| 4.3.3 | Adjustable controls | | N/A |

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|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 4.3.4 | Securing of parts | | P |
| 4.3.5 | Connection of plugs and sockets | | N/A |
| 4.3.6 | Direct plug-in equipment | | N/A |
| | Torque test (Nm) | | P |
| 4.3.7 | Heating elements in earthed equipment | | N/A |
| 4.3.8 | Batteries | | N/A |
| | Electric strength test | | N/A |
| 4.3.9 | Resistance to oil and grease | | N/A |
| 4.3.10 | Prevention of dangerous concentration of dust, powder, liquid and gas | | N/A |
| 4.3.11 | Containers for liquids or gases | | N/A |
| 4.3.12 | Flammable liquids | | N/A |
| | Quantity of liquids (L) | | N/A |
| | Flash point (℃) | | N/A |
| 4.3.13 | Radiation | | N/A |
| 4.3.13.1 | General | | --- |
| 4.3.13.2 | Ionizing radiation (≤0.1mR/h) | | N/A |
| 4.3.13.3 | Effect of ultraviolet (UV) radiation on materials | | N/A |
| 4.3.13.4 | Human exposure to ultraviolet (UV) radiation | | N/A |
| | Warning or symbol | | N/A |
| | Measurement of UV radiation | | N/A |
| 4.3.13.5 | Lasers (including laser diodes) and LEDs | | N/A |
| 4.3.13.5.1 | Lasers (including laser diodes) | | N/A |
| | Lasers class | | --- |
| 4.3.13.5.2 | Light emitting diodes (LEDs) | | N/A |
| 4.13.6 | Other types | | N/A |

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|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 4.4 | Protection against hazardous moving parts | | N/A |
| 4.4.1 | General | | N/A |
| 4.4.2 | Protection in operator access areas | | N/A |
| | Warning notice | | N/A |
| | Test finger test | | N/A |
| | Straight test finger (30N) | | N/A |
| 4.4.3 | Protection in restricted access locations | | N/A |
| | Warning notice | | N/A |
| | Test finger test | | N/A |
| | Straight test finger (30N) | | N/A |
| 4.4.4 | Protection in service access areas | | N/A |
| 4.5 | Thermal requirements | | P |
| 4.5.1 | Maximum temperatures | | P |
| | Thermal cut-outs and over-current protection not operate | | P |
| | Thermostats not interrupt the normal operation | | P |
| | Temperature limiters are permitted to operate | | P |
| | Sealing compounds not flow out | | P |
| | Temperature shall not exceed the values shown in table 4B, part 1 and 2 | | P |
| 4.5.2 | Temperature tests | | P |
| | Normal load condition per Annex L | | --- |
| 4.5.3 | Temperature limits for materials | | P |
| 4.5.4 | Temperature limits for materials | | P |
| 4.5.5 | Resistance to abnormal heat | | P |
| 4.6 | Openings in enclosures | | N/A |
| 4.6.1 | Top and side openings | | N/A |
| | Dimension (mm) | | N/A |
| 4.6.2 | Bottoms of fire enclosures | | N/A |
| | Constructions of bottoms | | N/A |
| 4.6.3 | Doors or covers in fire enclosures | | N/A |
| 4.6.4 | Openings in transportable equipment | | N/A |
| 4.6.5 | Adhesives for constructional purposes | | N/A |
| | Temperature and time conditions | | N/A |
| 4.7 | Resistance to fire | | P |
| 4.7.1 | Methods of reducing the risk of ignition and spread of flames | | P |

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| Clause | Requirement-Test | Result-Remark | Verdict |
| 4.7.2 | Conditions for a fire enclosure | | P |
| 4.7.2.1 | Parts requiring a fire enclosure | Pass muster | P |
| 4.7.2.2 | Parts not requiring a fire enclosure | | N/A |
| 4.7.3 | Materials | | P |
| 4.7.3.1 | General | | P |
| 4.7.3.2 | Materials for fire enclosures | | P |
| | Test A.1 (equipment>18kg) | | N/A |
| | HA1 test (equipment>18kg) | | N/A |
| | HW1 test (equipment>18kg) | | N/A |
| | Test A.2 (movable equipment≤18kg) | | P |
| | HA1 test (movable equipment≤18kg) | | N/A |
| | HW1 test (movable equipment≤18kg) | | N/A |
| 4.7.3.3 | Materials for components and other parts outside fire enclosures | | N/A |
| | GWT 550℃ | | N/A |
| 4.7.3.4 | Materials for components and other parts inside fire enclosures | | P |
| | Test A.2 | | N/A |
| 4.7.3.5 | Materials for air filter assemblies | | N/A |
| | Test A.2 | | N/A |
| 4.7.3.6 | Materials used in high-voltage components | | N/A |
| | Test of IEC 60065, 14.4 | | N/A |
| | Needle flame test | | N/A |
| 5 | ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS | | P |
| 5.1 | Touch current and protective conductor current | | N/A |
| 5.1.1 | General | | N/A |
| 5.1.2 | Equipment under test (EUT) | | N/A |
| 5.1.3 | Test circuit | | N/A |
| 5.1.4 | Application of measuring instrument | | N/A |
| 5.1.5 | Test procedure | | N/A |
| 5.1.6 | Test measurements | | N/A |
| | Test voltage (V) | | --- |
| | Measured touch current (mA) | | --- |
| | Maximum touch current (mA) | | --- |
| 5.1.7 | Equipment with touch current exceeding 3,5 Ma | | N/A |
| | Protective conductor current (Ma) | | N/A |

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|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| | The cross-sectional area of the protective bonding conductor ($mm^2$) | | N/A |
| | Warning labels | | N/A |
| 5.1.8 | Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks | | N/A |
| 5.1.8.1 | Limitation of the touch current to a telecommunication network and a cable distribution system | | N/A |
| | Test voltage (V) | | N/A |
| | Measured current (Ma) | | N/A |
| | Maximum touch current ≤0.25(Ma) | | N/A |
| 5.1.8.2 | Summation of touch currents from telecommunication networks | | P |
| 5.2 | Electric strength | | N/A |
| 5.2.1 | General | | N/A |
| 5.2.2 | Test procedure | | N/A |
| 5.3 | Abnormal operating and fault conditions | | P |
| 5.3.1 | Protection against overload and abnormal operation | | P |
| 5.3.2 | Motors (annex B) | | N/A |
| 5.3.3 | Transformers | | N/A |
| 5.3.4 | Functional insulation | | P |
| | Method used .....: | | P |
| 5.3.5 | Electromechanical components in secondary circuits | | N/A |
| 5.3.6 | Audio amplifiers in ITE .....: | | N/A |
| 5.3.7 | Simulation of faults | | P |
| 5.3.8 | Unattended use of equipment having thermostats, temperature limiters etc. | | N/A |
| 5.3.9 | Compliance criteria for abnormal operating and fault conditions | | P |
| 5.3.9.1 | During the tests | | P |
| 5.3.9.2 | After the tests | | P |

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| Clause | Requirement-Test | Result-Remark | Verdict |
| 6 | CONNECTION TO TELECOMMUNICATION NETWORKS | | N/A |
| 6.1 | Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment | | N/A |
| 6.1.1 | Protection from hazardous voltages | | N/A |
| 6.1.2 | Separation of the telecommunication network from earth | | N/A |
| 6.1.2.1 | Requirements | | N/A |
| | Test voltage (V) | | --- |
| | Current in the test circuit (mA) | | ---- |
| 6.1.2.2 | Exclusions | | N/A |
| 6.2 | Protection of equipment users from voltages on the telecommunication networks | | N/A |
| 6.2.1 | Separation requirements | | N/A |
| 6.2.2 | Electric strength test procedure | | N/A |
| 6.2.2.1 | Impulse test (10 impulses of alternating polarity): separation between TNV-1 circuits/TNV-3 circuits and: | | N/A |
| 6.2.2.1 a) | unearthed conductive parts/non-conductive parts of the equipment expected to be held or touched during normal use; test at 2,5 kV | | N/A |
| 6.2.2.1 b) | parts and circuitry that can be touched by the test finger except contacts of connectors that cannot be touched by test probe; test at 1,5 kV | | N/A |
| 6.2.2.1 c) | circuitry which is provided for connection of other equipment; test at 1,5 kV | | N/A |
| 6.2.2.2 | Steady-state test: separation between TNV-1 circuits/TNV-3 circuits and: | | N/A |
| 6.2.2.2 a) | unearthed conductive parts/non-conductive parts of the equipment expected to be held or touched during normal use; test at 1,5 kV | | N/A |
| 6.2.2.2 b) | parts and circuitry that can be touched by the test finger except contacts of connectors that cannot be touched by test probe; test at 1,0kV | | N/A |
| 6.2.2.2c) | circuitry which is provided for connection of other equipment; test at 1,0 kV | | N/A |
| 6.2.2.3 | Compliance criteria: no breakdown of insulation | | N/A |
| | The insulation resistance: ≥2MΩ | | N/A |
| 6.3 | Protection of telecommunication wiring system from overheating | | N/A |
| | Maximum output current (A) | | N/A |
| | Method of current limiting | | N/A |

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|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| 7 | Connection to cable distribution systems | | N/A |
| 7.1 | If the equipment is to be connected to a CABLE DISTRIBUTION SYSTEM, the requirements of Clause 7 apply in addition to the requirements of Clauses 1 to 5 of this standard. | | N/A |
| | – 10 kV for equipment to be connected only to an outdoor antenna;<br>– 4 kV to other equipment, see ITU-T Recommendations K.20, K.21 and K.45. | | N/A |
| 7.2 | Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment | | N/A |
| | Circuitry intended to be directly connected to a CABLE DISTRIBUTION SYSTEM shall comply with the requirements for a TNV-1 CIRCUIT, a TNV-3 CIRCUIT or a HAZARDOUS VOLTAGE SECONDARY CIRCUIT, depending on the normal operating voltage. | | N/A |
| | Where protection of the CABLE DISTRIBUTION SYSTEM relies on protective earthing of the equipment, the installation instructions and other relevant literature shall state that the integrity of the protective earth must be ensured, see also 1.7.2.1. | | N/A |
| 7.3 | Protection of equipment users from overvoltages on the cable distribution system | | N/A |
| | The requirements and tests of 6.2 apply except that the term "TELECOMMUNICATION NETWORK" is replaced by "CABLE DISTRIBUTION SYSTEM" throughout 6.2. When applying 6.2 to CABLE DISTRIBUTION SYSTEMS, the separation requirements apply only to those circuit parts that are directly connected to the inner conductor (or conductors) of the coaxial cable; the separation requirements do not apply to those circuit parts that are directly connected to the outer screen or screens. | | N/A |
| | However, the separation requirements and tests of 6.2.1 a), b) and c) do not apply to a CABLE DISTRIBUTION SYSTEM if all of the following apply: | | N/A |
| | − the circuit under consideration is a TNV-1 CIRCUIT; and | | N/A |
| | – the common or earthed side of the circuit is connected to the screen of the coaxial cable and to all accessible parts and circuits (SELV, accessible metal parts and LIMITED CURRENT CIRCUITS, if any); and | | N/A |
| | – the screen of the coaxial cable is intended to be connected to earth in the building installation. | | N/A |
| 7.4 | Insulation between primary circuits and cable distribution systems | | N/A |
| 7.4.1 | General | | --- |

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|---|---|---|---|
| Clause | Requirement-Test | Result-Remark | Verdict |
| | Except as specified below, the insulation between the PRIMARY CIRCUIT and the terminal or lead provided for the connection of a CABLE DISTRIBUTION SYSTEM shall pass either: | | N/A |
| | − the voltage surge test of 7.4.2 for equipment intended to be connected to outdoor antennas; or | | N/A |
| | − the impulse test of 7.4.3 for equipment intended to be connected to other CABLE DISTRIBUTION SYSTEMS. | | N/A |
| | If an equipment is intended for connection to both an outdoor antenna and another CABLE DISTRIBUTION SYSTEM, it shall pass the tests of 7.4.2 and 7.4.3. | | N/A |
| | The above requirement does not apply to any of the following: | | N/A |
| | − equipment intended for indoor use only, provided with a built in (integral) antenna and not provided with a connection to a CABLE DISTRIBUTION SYSTEM;<br>− PERMANENTLY CONNECTED EQUIPMENT or PLUGGABLE EQUIPMENT TYPE B, in which the circuit intended to be connected to the CABLE DISTRIBUTION SYSTEM is also connected to protective earth in accordance with 2.6.1 e);<br>− PLUGGABLE EQUIPMENT TYPE A, in which the circuit intended to be connected to the CABLE DISTRIBUTION SYSTEM is also connected to protective earth in accordance with 2.6.1 e); and either | | N/A |
| | . is intended to be installed by a SERVICE PERSON and has installation instructions that require the equipment to be connected to a socket-outlet with a protective earthing connection; or | | N/A |
| | . has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR, including instructions for the installation of that conductor. | | N/A |
| 7.4.2 | Voltage surge test | | N/A |
| | The test is applied between the supply circuit terminals and the main protective earthing terminal, if any, joined together, and the connection points for the CABLE DISTRIBUTION SYSTEM, excluding any earthed conductor, joined together. All components connected between the connection points for the CABLE DISTRIBUTION SYSTEM and the main protective earthing terminal are disconnected before the test. If an on/off switch is provided, it is in the "ON" position. | | N/A |
| | Conditioning pulses are applied between − the connection points for the CABLE DISTRIBUTION SYSTEM, excluding any earthed conductor, joined together, and<br>− the supply circuit terminals and the main protective earthing terminal, if any, joined together. | | N/A |

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| Clause | Requirement-Test | Result-Remark | Verdict |
| | Fifty discharges are applied from the impulse test generator reference 3 of Table N.1, at a maximum rate of 12 pulses per minute, with Uc equal to 10 kV. | | N/A |
| | After the above conditioning, the relevant electric strength tests of 5.2.2 are applied. | | N/A |
| 7.4.3 | Impulse test | | N/A |
| | The test is applied between the supply circuit terminals and the main protective earthing terminal, if any, joined together, and the connection points for the CABLE DISTRIBUTION SYSTEM, excluding any earthed conductor, joined together. All components connected between the connection points for the CABLE DISTRIBUTION SYSTEM and the main protective earthing terminal are disconnected before the test. If an on/off switch is provided, it is in the "ON" position. | | N/A |
| | Ten conditioning pulses of alternating polarity are applied from the impulse test generator reference 1 of Table N.1. The interval between successive pulses is 60 s, and Uc is equal to | | N/A |
| | − 5 kV for power-fed repeaters;<br>− 4 kV for all other terminal and network equipment. | | N/A |
| | After the above conditioning, the relevant electric strength tests of 5.2.2 are applied. | | N/A |

| B | ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITONS | | N/A |
|---|---|---|---|
| B.1 | General requirements | | N/A |
| | Position | | --- |
| | Manufacture | See appended table | --- |
| | Type | See appended table | --- |
| | Rated voltage (V) or current (A) | See appended table | --- |

| | | | |
|---|---|---|---|
| B.2 | Test conditions | | N/A |
| B.3 | Maximum temperatures (℃) | | N/A |
| B.4 | Running overload test | | N/A |
| B.5 | Locked-rotor overload test | | N/A |
| | Test duration (days) | | N/A |
| | Electric strength test: test voltage (V) | | N/A |
| B.6 | Running overload test for DC motor in secondary circuits | | N/A |
| B.7 | Locked-rotor overload test for DC motor in secondary circuits | | N/A |
| B.7.1 | Test procedure: Test time (h) | | N/A |
| B.7.2 | Alternative test procedure: Test time (h) | | N/A |
| B.7.3 | Electric strength test | | N/A |
| B.8 | Test for motors with capacitors | | N/A |
| B.9 | Test for three-phase motors | | N/A |
| B.10 | Test for series motors | | N/A |
| | Test voltage (V) | | N/A |

| | | | |
|---|---|---|---|
| **C** | ANNEX C, TRANSFORMERS | see appended table | **N/A** |
| | Positin | | N/A |
| | Manufacture | | N/A |
| | Type | | N/A |
| | Rated values | | N/A |
| | Method of protection | | N/A |
| C.1 | Overload test | | P |
| | Type of transformer | | P |
| C.2 | Insulation | | N/A |
| | Precautions | | N/A |
| | Retaining of end turns of all windings | | N/A |
| | The screen shall meet clause 2.6.3.3 and 2.6.3.4 | | N/A |
| | Electric strength test | | N/A |

| | | | |
|---|---|---|---|
| **G** | **ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES** | | **N/A** |
| G.1 | Summary of the procedure for determining minimum clearances | | N/A |
| G.2 | Determination of mains transient voltage | | N/A |
| G.2.1 | AC mains supply | | N/A |
| G.2.2 | DC mains supply | | N/A |
| G.3 | Determination of telecommunication network transient voltage | | N/A |
| G.4 | Deternination of required withstand voltage | | N/A |
| G.5 | Measurement of transient voltage levels | | N/A |
| G.6 | Deternination of minimum clearances | | N/A |

| | | | |
|---|---|---|---|
| **H** | **ANNEX H, IONIZING GRDIATION** | | **N/A** |
| | Ionizing radiation | | N/A |
| | Measured radiation | | N/A |
| | Measured high-voltage (kV) | | N/A |
| | Measured focus voltage (kV) | | N/A |
| | CRT markings | | N/A |
| | Cercified by | | N/A |
| | Standard used | | N/A |

| J | ANNEX H, TALBE OF ELECTROCHEMICAL POTENTIALS | | N/A |
|---|---|---|---|
| | The use of metals | Metals which the combination electrochemical potential is less than 0.6V. | --- |

| K | ANNEX K, THERMAL CONTROLS | | N/A |
|---|---|---|---|
| K.1 | Marking and breaking capacity | | N/A |
| K.2 | Thermostat reliability: (200 cycles) | | N/A |
| | Operation voltage (V) | | N/A |
| K.3 | Thermostat endurance test: (10 000 cycles) | | N/A |
| | Operation voltage (V) | | N/A |
| K.4 | Temperature limiter endurance: (1000 cycles) | | N/A |
| | Operation voltage (V) | | N/A |
| K.5 | Thermal cut-out reliability: (200 times or 10 times) | | N/A |
| K.6 | Stability of operation | | N/A |

| M | ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS | | N/A |
|---|---|---|---|
| M.2 | Method A | | N/A |
| M.3 | Method B | | N/A |
| M.3.1 | Ringing signal | | N/A |
| M.3.1.1 | Frequency | | N/A |
| M.3.1.2 | Voltage | | N/A |
| M.3.1.3 | Cadence: Duration (s), Voltage (V) | | N/A |
| M.3.1.4 | Single fault current (mA) | | N/A |
| M.3.2 | Tripping device and monitoring voltag | | N/A |
| M.3.2.1 | Conditions for use of a tripping device or a monitoring voltage | | N/A |
| M.3.2.2 | Tripping device | | N/A |
| M.3.2.3 | Monitoring voltage (V) | | N/A |

| U | ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION | | N/A |
|---|---|---|---|
| U.1 | Wire construction | | N/A |
| U.2 | Type tests | | N/A |
| U.2.1 | Electric strength | | N/A |
| U.2.2 | Flexibility and adherence | | N/A |
| U.2.3 | Heat shock | | N/A |
| U.2.4 | Retention of electric strength after bending | | N/A |
| U.3 | Tests during manufacture | | N/A |
| U.3.1 | Routine testing | | N/A |
| U.3.2 | Sampling tests | | N/A |

| Y | ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST | | N/A |
|---|---|---|---|
| Y.1 | Test apparatus | | N/A |
| Y.2 | Mounting of test samples | | N/A |
| Y.3 | Carbon-arc light-exposure apparatus | | N/A |
| Y.4 | Xenon-arc light-exposure apparatus | | N/A |

| ZB | ANNEX ZB, SPECIAL NATIONAL CONDITIONS | | N/A |
|---|---|---|---|
| 1.2.4.1 | In Denmark, certain types of / appliance may be provided with a plug not establishing earthing conditions when inserted into Danish socket-outlets. | | N/A |
| 1.5.8 | In Norway, due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (AC220-240V) | | P |
| 1.7.2 | In Finland, Norway and Sweden, / Pluggable equipment type A intended for connection to other equipment or a network shall have a marking stating that the equipment must be connected to an earthed mains socket-outlet, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts. | | N/A |
| 1.7.5 | In Denmark, socket-outlets for providing power to other equipment shall be in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-3a, DK 1-5a or DK 1-7a, when used on / equipment. For STATIONARY EQUIPMENT the socket-outlet shall be in accordance with Standard Sheet DK 1-1b or DK 1-5a. | | N/A |
| 2.2.4 | In Norway, 1.7.2 and 6.1.2.1 of this annex apply | | N/A |
| 2.3.2 | In Norway, 6.1.2.1 of this annex apply | | N/A |
| 2.3.3 | In Norway, 1.7.2 and 6.1.2.1 of this annex apply | | N/A |
| 2.3.4 | In Norway, 1.7.2 and 6.1.2.1 of this annex apply | | N/A |
| 2.6.3.3 | In the United Kingdom, the current rating of the circuit shall be taken as 13A, not 16A. | | N/A |
| 2.7.1 | In the United Kingdom, to protect against excessive currents and short-circuits in the PRIMARY CIRCUIT of DIRECT PLUG-IN EQUIPMENT, protective devices shall be included as integral parts of the DIRECT PLUG-IN EQUIPMENT. | | N/A |
| 2.10.3.1 | In Norway, due to the IT power distribution system used, the A.C. MAINS SUPPLY voltage is considered to be equal to the line-to-line voltage and will remain at AC220-240V in case of a single earth fault. | | N/A |
| 3.2.1.1 | In Switzerland, plug types (rated current not exceeding 10A) | | N/A |
| | In Switzerland, plug types (rated current 16A) | | N/A |
| | In Denmark, a plug according to the Heavy Current Regulations, Section 107-2-D1 (for single-phase equipment having a rated current not exceeding 13A) | | N/A |
| | In Denmark, a plug according to the Standard Sheet Dk 2-1a or DK 2-5a (for / equipment) | | N/A |

| | | | |
|---|---|---|---|
| | In Denmark, a plug according to the Heavy Current Regulations, Section 107-2-D1 or EN60309-2 (for poly-phase and single-phase equipment having a rated current exceeding 13A) | | N/A |
| | In Spain, a plug according to UNE 20315 (for single-phase equipment having a rated current not exceeding 10A) | | N/A |
| | In Spain, a plug according to UNE-EN50075 (for single-phase equipment having a rated current not exceeding 2,5A) | | N/A |
| | In Spain, a plug according to UNE 20315 (for / equipment) | | N/A |
| | In Spain, a plug according to UNE-en60309-2 (for poly-phase equipment) | | N/A |
| | In the United Kingdom, standard plug in accordance with SI 1768 | | N/A |
| | In Ireland, a 13A plug in accordance with SI 525 | | N/A |
| 3.2.5.1 | In the United Kingdom, a power supply cord with conductor of 1,25mm$^2$ is allowed for equipment with a rated current over 10A and up to and including 13A. | | N/A |
| 3.3.4 | In the United Kingdom, the range of conductor sizes of flexible cords is 1,25mm$^2$ to 1,5 mm$^2$ | | N/A |
| 4.3.6 | In the United Kingdom, the torque test of DIRECT PLUG-IN EQUIPMENT | | N/A |
| | In Ireland, DIRECT PLUG-IN EQUIPMENT complying with SI 526 | | N/A |
| 6.1.2.1 | In Finland, Norway and Sweden, layers or distance of insulation | | N/A |
| | Electric strength test | | N/A |
| | The insulation forms part of a semiconductor component | | N/A |
| | Bridge the insulation with a Y capacitor complying with EN 132400 | | N/A |
| 6.1.2.2 | In Finland, Norway and Sweden, the exclusions are applicable for PERMANENTLY CONNECTED EQUIPMENT and PLUGGABLE EQUIPMENT TYPE B and equipment used in a RESTRICTED ACCESS LOCATION | | N/A |
| 7.1 | In Finland, Norway and Sweden, clause 6.1.2.1 and 6.1.2.2 apply | | N/A |
| G.2.1 | In Norway, the AC mains supply voltage will remain at 230V in case of a single earth fault. | | N/A |

| 2.10.3 and 2.10.4 | TABLE: clearance and creepage distance measurements | | | | | N/A |
|---|---|---|---|---|---|---|
| Clearance Cl and creepage distance Cr at/of: | Up (V) | U r.m.s. (V) | Required Cl (mm) | Cl (mm) | Required Cr (mm) | Cr (mm) |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| 2.10.5 | TABLE: distance through insulation measurements | | | | N/A |
|---|---|---|---|---|---|
| Distance through insulation Di at/of: | | U r.m.s. (V) | Test voltage (V) | Required Di (mm) | Di (mm) |
| | | | | | |
| | | | | | |

| 4.5 | TABLE: temperature rise measurements | | | N/A |
|---|---|---|---|---|
| | Test voltage (V) ..... | 90 | 264 | — |

| Operating conditions: | | | |
|---|---|---|---|
| Pink noise signal to audio input, rated load to output , and adjust the volume to the 1/8 of non-clipping output power. Con tenuous operation 4h. | | | |
| Monitored point: | T (°C) | | Permitted T (°C) |
| | 198V | 242V | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | --- |

| Winding temperature rise measurements: | | N/A |
|---|---|---|
| Ambient temperature t1 (℃) | 22.0/22.0 | --- |
| Ambient temperature t2 (℃) | 22.0/22.0 | --- |

| 4.5.2 | TABLE: the ball pressure test of thermoplastic parts | | N/A |
|---|---|---|---|
| | Allowable diameter of impression | not exceeding 2 mm | --- |
| Part | | Test temperature (℃) | Diameter of impression |
| | | | |

| 5.2 | TABLE: electric strength test | | N/A |
|---|---|---|---|
| Test voltage applied between: | | Test voltage (V) | Breakdown |
| | | | |
| | | | |
| | | | |

| 5.3 | TABLE: summary of fault condition tests | | N/A |
|---|---|---|---|
| | Rated markings of power supply .....: | | |
| | Ambient temperature (℃).....: | 22 | |

| No. | Component No. | Fault | Test voltage (V) | Test time | Result |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

**Remarks : SC: short-circuit OC: open-circuit VAM: Video Amplification Module**

| 6.2 | TABLE: impulse tests | N/A |
|---|---|---|
| test voltage applied between: | test voltage (V) | breakdown Yes / No |
| --- | --- | --- |
| | | |

| A.6.5 | TABLE: flammability test for classifying materials V-0, V-1 or V-2 | N/A |
|---|---|---|

| sample No. / ref. | afterflame time (s) $t_1$ or $t_2$ | afterflame + afterglow (s) after 2nd flame application $t_2 + t_3$ |
|---|---|---|
| 1/A | | |
| 2/A | | |
| 3/A | | |
| 4/A | | |
| 5/A | | |
| 6/B | | |
| 7/B | | |
| 8/B | | |
| 9/B | | |
| 10/B | | |

| supplementary information: |
|---|
| Total afterflame time (s) for any condition set $t_1 + t_2$ for five (5) specimens: |
| Conditioning "A" designates 7 days at 70 °C ± 1 °C followed by 4 h minimum in calcium chloride desiccator. |
| Conditioning "B" designates 48 h at 23 °C ± 2 °C and relative humidity between 45 % and 55 %. |
| |

| A.6.6 | TABLE: flammability re-test for classifying materials V-0, V-1 or V-2 | N/A |
|---|---|---|

| sample No. | afterflame time (s) $t_1$ or $t_2$ | afterflame + afterglow (s) after 2nd flame application $t_2 + t_3$ |
|---|---|---|
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |

| supplementary information: |
|---|
| Total afterflame time (s) for any condition set $t_1 + t_2$ for five (5) specimens: |
| |
| |

| A.7.4, A.7.5, A.7.6 and A.7.7 | TABLE: flammability test for classifying foam materials HF-1, HF-2 or HBF | N/A |
|---|---|---|

| sample No. / ref. | flame time (s) | glow time (s) | flaming/glowing distance from the end (mm) | comment (for A.7.7 burning rate mm/min) |
|---|---|---|---|---|
| 1/A | | | | |
| 2/A | | | | |
| 3/A | | | | |
| 4/A | | | | |
| 5/A | | | | |
| 6/B | | | | |
| 7/B | | | | |
| 8/B | | | | |
| 9/B | | | | |
| 10/B | | | | |

| supplementary information: |
|---|
| |
| Conditioning "A" designates 7 days at 70 °C ± 1 °C followed by 4 h minimum in calcium chloride desiccator. |
| Conditioning "B" designates 48 h at 23 °C ± 2 °C and relative humidity between 45 % and 55 %. |

| A.7.8 | TABLE: flammability re-test for classifying foam materials HF-1 or HF-2 | | | N/A |
|---|---|---|---|---|
| sample No. | flame time (s) | glow time (s) | flaming/glowing distance from the end (mm) | comment |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| supplementary information: | | | | |
| | | | | |
| | | | | |

| A.7.9 | TABLE: flammability re-test for classifying foam materials HBF | | | N/A |
|---|---|---|---|---|
| sample No. | flame time (s) | glow time (s) | flaming/glowing distance from the end (mm) | comment (for A.7.7 burning rate mm/min) |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| supplementary information: | | | | |
| | | | | |
| | | | | |

| A.8.5 | TABLE: flammability test for classifying materials HB | N/A |
|---|---|---|
| sample No. | flaming/glowing rate mm/min | flaming/glowing distance from reference mark (mm) |
| 1 | | |
| 2 | | |
| 3 | | |
| supplementary information: | | |
| | | |
| | | |

| A.8.6 | TABLE: flammability re-test for classifying materials HB | N/A |
|---|---|---|
| sample No. | flaming/glowing rate mm/min | flaming/glowing distance from reference mark (mm) |
| 4 | | |
| 5 | | |
| 6 | | |
| supplementary information: | | |
| | | |
| | | |

| A.9.6 | TABLE: flammability test for classifying materials 5V | | | | N/A |
|---|---|---|---|---|---|
| sample No. | test bars | | test plaques | | |
| | flaming + glowing time (s) | burning istance (mm) | position | flaming + glowing time(s) | burning distance (mm) |
| 1/A | | | A | | |
| 2/A | | | B | | |
| 3/A | | | C | | |
| 4/A | | | D | | |
| 5/A | | | ---- | ---- | ---- |
| 6/B | | | A | | |
| 7/B | | | B | | |
| 8/B | | | C | | |
| 9/B | | | D | | |
| 10/B | | | ---- | | |
| supplementary information: | | | | | |
| Conditioning "A" designates 7 days at 70 °C ± 1 °C followed by 4 h minimum in calcium chloride desiccator. | | | | | |
| Conditioning "B" designates 48 h at 23 °C ± 2 °C and relative humidity between 45 % and 55 %. | | | | | |

| A.9.7 | TABLE: flammability test for classifying materials 5V | | | | N/A |
|---|---|---|---|---|---|
| sample No. | test bars | | test plaques | | |
| | flaming + glowing time (s) | burning istance (mm) | position | flaming + glowing time(s) | burning distance (mm) |
| 11 | | | A | | |
| 12 | | | B | | |
| 13 | | | C | | |
| 14 | | | D | | |
| 15 | | | ---- | ---- | ---- |
| supplementary information: | | | | | |
| | | | | | |
| | | | | | |

# EMC Technical Construction File

Report No: TRZJ21011228835

Issued for

ZHEJIANG IWALK TECHNOLOGY CO., LTD.

NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA

| | |
|---|---|
| **Product Name:** | Electric Scooter |
| **Brand Name:** | / |
| **Main Name:** | KS1 |
| **Series Model:** | KS1 |
| **Test Standard:** | EN 301489-1 V2.2.3:2019 ,<br>EN 301489-17 V3.2.0:2017 |

## TEST REPORT CERTIFICATION

**Applicant's name** ..... : ZHEJIANG IWALK TECHNOLOGY CO., LTD.

**Address** ..... :NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA

**Manufacturer's Name** ..... : ZHEJIANG IWALK TECHNOLOGY CO., LTD.

Address ..... : NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA

**Product description**

Product name ..... : Electric Scooter

Main Name ..... KS1

Series Model ..... : KS1

**Standards**..... : EN 301489-1 V2.2.3:2019 ,
EN 301489-17 V3.2.0:2017

This device described above has been tested by GTS, and the test results show that the equipment under test (EUT) is in compliance with the 2014/53/EU RED Directive Art.3.2 requirements. And it is applicable only to the tested sample identified in the report.

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**Date of Test** ..... :

Date (s) of performance of GTS..... : January 12,2021 to January 19,2021

Date of Issue..... : January 19,2021

Test Result ..... : **Pass**

Testing Engineer : Kein Shan
( Kein Shan )

Technical Manager : Johnson Lai
(Fohnson Lai)

Authorized Signatory : Johnson Lai
(Fohnson Lai)

GLOBAL TESTING SERVICES CO.,LTD. GTS CERTIFICATION

# TABLE OF CONTENTS

## Revision History

| Rev. | Issue Date | Report NO. | Effect Page | Contents |
|---|---|---|---|---|
| 00 | January 19,2021 | TRZJ210112288 35 | ALL | Initial Issue |

Note: **Format version** of the report -V01

## 1. TEST SUMMARY

Test procedures according to the technical standards:

Draft EN 301489-17 V3.2.0:2017

| EMC Emission | | | | |
|---|---|---|---|---|
| Standard | Test Item | Limit | Judgment | Remark |
| EN 55032:2015 | Conducted Emission On AC And Telecom Port 150kHz to 30MHz | Class B | N/A | |
| | Radiated Emission 30MHz to 1000MHz | Class B | PASS | |
| | Radiated Emission 1GHz to 6GHz | Class B | PASS | NOTE (1) |
| **EMC Immunity** | | | | |
| Section | Test Item | Performance Criteria | Judgment | Remark |
| EN 61000-4-2:2009 | Electrostatic Discharge | B | PASS | |
| EN 61000-4-3:2006+A1: 2008+ A2:2010 | RF electromagnetic field | A | PASS | |
| EN 61000-4-4:2012 | Fast transients | B | N/A | |
| EN 61000-4-5:2014+A1:2017 | Surges | B | N/A | |
| EN 61000-4-6:2014 | Injected Current | A | N/A | |
| EN 61000-4-11:2004+A1:2017 | Volt. Interruptions Volt. Dips | B / C / C | N/A | NOTE (2) |

Note:
(1) If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.
If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.
If the highest frequency of the internal sources of the EUT is between 500 MHz and 1GHz, measurement shall only be made up to 5 GHz.
If the highest frequency of the internal sources of the EUT is above 1 GHz, the Measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

(2) Voltage dip: 100% reduction – Performance Criteria B

Voltage dip: 30% reduction – Performance Criteria C

Voltage Interruption: 100% Interruption – Performance Criteria C

(3) For client's request and manual description, the test will not be executed.

(4) "N/A" denotes test is not applicable in this Test Report

### 1.1 TEST FACTORY

| | |
|---|---|
| Company Name: | Shanghai Global Testing Services Co., Ltd. |
| Address: | Floor 2nd, Building D-<br>1, No. 128, Shenfu Road, Minhang District, Shanghai, China. |
| Telephone: | +86-021-33637866 |
| Fax: | +86-021-33637858 |

### 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**,where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**,providing a level of confidence of approximately **95** %.

A. Conducted Measurement :

| Test Site | Method | Measurement Frequency Range | U,(dB) | NOTE |
|---|---|---|---|---|
| GTSC01 | ANSI | 9KHz-150KHz | 2.88 | |
| | | 150 KHz ~ 30MHz | 2.67 | |

B. Radiated Measurement :

| Test Site | Method | Measurement Frequency Range | U,(dB) | NOTE |
|---|---|---|---|---|
| GTSC02 | ANSI | 30MHz ~ 200MHz | 3.73 | |
| | | 200MHz ~ 1000MHz | 3.92 | |
| | | 1GHz ~ 6 GHz | 3.31 | |

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Product Name | Electric Scooter |
| Brand Name | / |
| Main Name | KS1 |
| Series Model | KS1 |
| Model Difference | / |
| Product Description | The EUT is Electric Scooter<br>Input voltage 100-240V<br>More details of EUT technical specification, please refer to the User's Manual. |
| Hardware version number | N/A |
| Software version number | N/A |

## 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |
|---|---|
| Mode 1 | BT Mode |

| For Radiated Test | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | BT Mode |

| For EMS Test | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | BT Mode |

Note: The test modes were carried out for all operation modes(include link and idle).
The final test mode of the EUT was the for Mode 1, and its test data was showed.

## 2.3 DESCRIPTION OF TEST SETUP

## 2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the teGTS.

| Item | Equipment | Mfr/Brand | Model/Type No. |
|---|---|---|---|
| N/A | N/A | N/A | N/A |
| | | | |
| | | | |

| Item | Shielded Type | Ferrite Core | Length |
|---|---|---|---|
| N/A | N/A | N/A | N/A |
| | | | |
| | | | |

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

(3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

## 2.5 MEASUREMENT INSTRUMENTS LIST

### 2.5.1 RADIATED TEST SITE

| Kind of Equipment | Manufacturer | Type No. | Serial No. | Last Calibration | Calibrated Until |
|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI | 102086 | 2019.10.15 | 2021.10.14 |
| Bilog Antenna | TESEQ | CBL6111D | 34678 | 2019.10.15 | 2021.10.14 |
| Horn Antenna | SCHWARZBECK | BBHA 9120D | 1343 | 2019.10.15 | 2021.10.14 |
| Spectrum Analyzer | Agilent | E4407B | MY50140340 | 2019.10.15 | 2021.10.14 |
| Pre-mplifier(1G-18G) | Agilent | 8449B | 60538 | 2019.10.15 | 2021.10.14 |
| Spectrum Analyzer | Agilent | N9020A | MY49100060 | 2019.10.15 | 2021.10.14 |
| Pre-mplifier(0.1M-3GHz) | EM | EM330 | -- | 2019.10.15 | 2021.10.14 |

### 2.5.2 ESD

| Kind of Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|
| ESD TEST GENERATOR | HAEFELY | ONYX 16 | 173835 | 2019.10.15 | 2021.10.14 |

### 2.5.3 RS

| Kind of Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|
| RF Relay matrix tsj | TSJ | RFM-S621 | 04261 | 2019.10.15 | 2021.10.14 |
| Power meter | Agilent | E4419B | QB4331226 | 2019.10.15 | 2021.10.14 |
| Power Sensor | Agilent | 8481A | MY41092622 | 2019.10.15 | 2021.10.14 |
| Power Sensor | Agilent | 8481A | US37296783 | 2019.10.15 | 2021.10.14 |
| Signal Generator | Agilent | N5182A | MY46240556 | 2019.10.15 | 2021.10.14 |
| Power Amplifier | MICOTOP | MPA-80-1000-250 | 1711489 | 2019.10.15 | 2021.10.14 |
| Power Amplifier | MICOTOP | MPA-1000-3000-75 | 1711488 | 2019.10.15 | 2021.10.14 |
| Power Amplifier | MICOTOP | MPA-3000-6000-50 | MPA1706275 | 2019.10.15 | 2021.10.14 |
| Logarithmic-periodic Antenna | Schwarzbeck | VULP9118E | 820 | 2019.10.15 | 2021.10.14 |
| Microwave Horn Antenna | Schwarzbeck | BBHA 9120LF | F01008 | 2019.10.15 | 2021.10.14 |

# 3. EMC EMISSION TEST

## 3.1 CONDUCTED EMISSION MEASUREMENT

### 3.1.1 POWER LINE CONDUCTED EMISSION

**(Frequency Range 150KHz-30MHz)**

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 |
| 5.0 -30.0 | 73.00 | 60.00 | 60.00 | 50.00 |

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

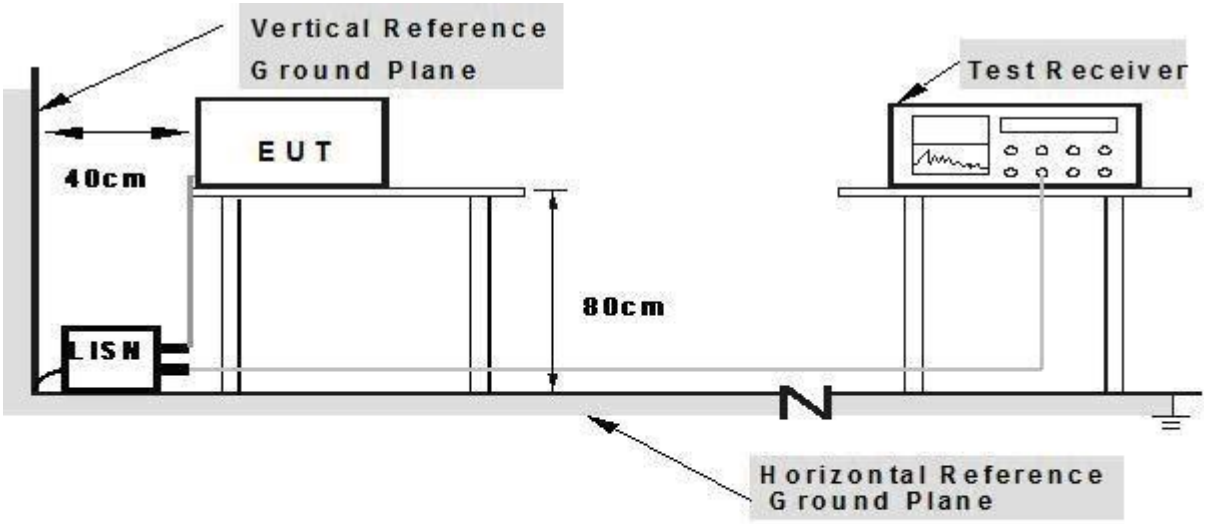
The following table is the setting of the receiver

| Receiver Parameters | Setting |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

### 3.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.1.3 TEST SETUP




**Note: 1.Support units were connected to second LISN.**
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

### 3.1.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

### 3.1.5 TEST RESULTS

| | | | |
|---|---|---|---|
| Temperature: | 26℃ | Relative Humidity: | 54% |
| Phase: | L/N | Test Mode: | N/A |
| Test Voltage: | 220VAC | | |

Note: DC 6V test is not applicable in this test report.

## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

| FREQUENCY (MHz) | Class A | | Class B | |
|---|---|---|---|---|
| | At 10m | At 3m | At 10m | At 3m |
| | dBuV/m | dBuV/m | dBuV/m | dBuV/m |
| 30 – 230 | 40 | 50 | 30 | 40 |
| 230 – 1000 | 47 | 57 | 37 | 47 |

### 3.2.2 LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

| FREQUENCY (MHz) | Class A (at 3m) dBuV/m | | Class B (at 3m) dBuV/m | |
|---|---|---|---|---|
| | Peak | Avg | Peak | Avg |
| 1000-3000 | 76 | 56 | 70 | 50 |
| 3000-6000 | 80 | 60 | 74 | 54 |

Notes:

(1) The limit for radiated test was performed according to as following:CISPR 32.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

### 3.2.3 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured, above 1G Average detector mode will be instead.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP(AV) Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz

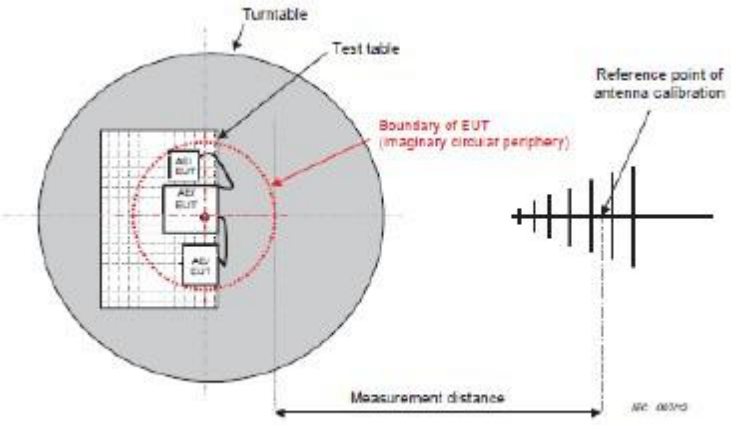



Figure C.1 – Measurement distance

(B) Radiated Emission Test Set-Up Frequency Above 1GHz

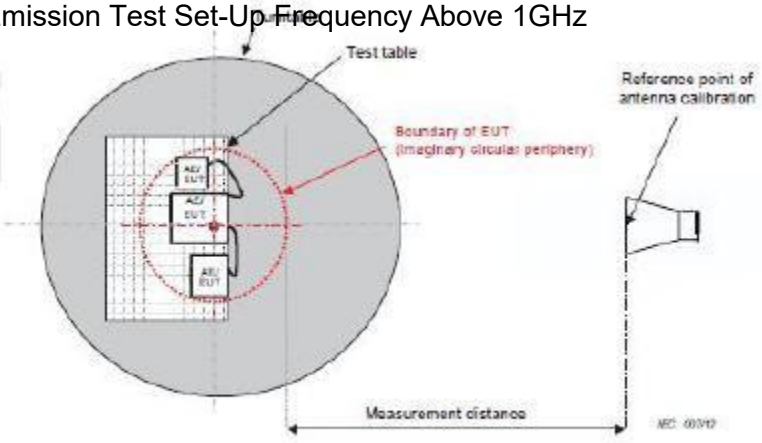



Figure C.1 – Measurement distance

### 3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

### 3.2.6 TEST RESULTS(30 - 1000 MHz)

| Temperature: | 25.7℃ | Relative Humidity: | 63% |
|---|---|---|---|
| Phase: | Horizontal | Test Mode: | Mode 1 |
| Test Voltage: | 220VAC | | |

| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB) | Results (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 47.3253 | 37.18 | -20.10 | 17.08 | 40.00 | -22.92 | QP |
| 2 | 68.6310 | 43.70 | -24.14 | 19.56 | 40.00 | -20.44 | QP |
| 3 | 102.7192 | 36.65 | -18.96 | 17.69 | 40.00 | -22.31 | QP |
| 4 | 150.0108 | 35.77 | -17.97 | 17.80 | 40.00 | -22.20 | QP |
| 5 | 316.5890 | 30.82 | -14.28 | 16.54 | 47.00 | -30.46 | QP |
| 6 | 408.9460 | 27.41 | -11.08 | 16.33 | 47.00 | -30.67 | QP |

Remark:
1. All readings are Quasi-Peak.
2. Margin = Result (Result =Reading + Factor )–Limit.
3. Factor= Cable Loss +Antenna Factor-Amplifier Gain

| Temperature: | 25.7℃ | Relative Humidity: | 63% |
|---|---|---|---|
| Phase: | Vertical | Test Mode: | Mode 1 |
| Test Voltage: | 220VAC | | |

| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor (dB) | Results (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 47.9940 | 35.92 | -20.45 | 15.47 | 40.00 | -24.53 | QP |
| 2 | 66.9670 | 43.76 | -24.17 | 19.59 | 40.00 | -20.41 | QP |
| 3 | 105.2718 | 35.57 | -18.74 | 16.83 | 40.00 | -23.17 | QP |
| 4 | 175.0367 | 35.72 | -19.38 | 16.34 | 40.00 | -23.66 | QP |
| 5 | 501.1790 | 32.50 | -8.90 | 23.60 | 47.00 | -23.40 | QP |
| 6 | 896.9965 | 28.36 | -2.30 | 26.06 | 47.00 | -20.94 | QP |

Remark:
1. All readings are Quasi-Peak.
2. Margin = Result (Result =Reading + Factor )–Limit.
3. Factor= Cable Loss +Antenna Factor-Amplifier Gain

### 3.2.7 TEST RESULT (1000 - 6000 MHz)

| Temperature: | 24 ℃ | Relative Humidity: | 54 % |
|---|---|---|---|
| Test Mode: | Mode 1 | Test Power: | 220VAC |

| Freq. (MHz) | Reading (dBuV) | Corr.Factor (dB) | Measured (dBuV/m) | Limits (dBuV/m) | Margins (dBuV/m) | Ant. H/V | Mark |
|---|---|---|---|---|---|---|---|
| 2765.05 | 67.92 | -11.02 | 56.90 | 70.00 | -13.10 | V | PK |
| 2765.05 | 49.00 | -11.02 | 37.97 | 50.00 | -12.03 | V | AVG |
| 3702.46 | 74.57 | -15.36 | 59.22 | 74.00 | -14.78 | V | PK |
| 3702.46 | 53.33 | -15.36 | 37.97 | 54.00 | -16.03 | V | AVG |
| | | | | | | | |
| 2765.05 | 65.34 | -11.02 | 54.31 | 70.00 | -15.69 | H | PK |
| 2765.05 | 49.62 | -11.02 | 38.59 | 50.00 | -11.41 | H | AVG |
| 3702.46 | 74.69 | -15.36 | 59.34 | 74.00 | -14.66 | H | PK |
| 3702.46 | 53.44 | -15.36 | 38.09 | 54.00 | -15.91 | H | AVG |

Remark:
Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit

## 4. EMC IMMUNITY TEST

4.1 GENERAL PERFORMANCE CRITERIA

4.1.1 PERFORMANCE CRITERIA (Bluetooth)

According to **Draft ETSI EN 301 489-17** standard, the general performance criteria as following:

| Criteria | During the test | After the test |
|---|---|---|
| A | Shall operate as intended May show degradation of performance (see note 1) Shall be no loss of function Shall be no unintentional transmissions | Shall operate as intended Shall be no degradation of performance (see note 2) Shall be no loss of function Shall be no loss of stored data or user programmable functions |
| B | May show loss of function (one or more) May show degradation of performance (see note 1) No unintentional transmissions | Functions shall be self-recoverable Shall operate as intended after recovering Shall be no degradation of performance (see note 2) Shall be no loss of stored data or user programmable functions |
| C | May be loss of function (one or more) | Functions shall be recoverable by the operator Shall operate as intended after recovering Shall be no degradation of performance (see note 2) |

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: no degradation of performance after the test is understood as any degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

**PERFORMANCE FOR TT**

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. TeGTS shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

**PERFORMANCE FOR TR**

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

**PERFORMANCE FOR CT**

The performance criteria A shall apply. TeGTS shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an Acknowledgement (ACK) or Not Acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

**PERFORMANCE FOR CR**

The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

4.1.2 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

## 4.2 ESD TESTING

4.2.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-2 |
| Discharge Impedance: | 330 ohm / 150 pF |
| Required Performance | B |
| Discharge Voltage: | Air Discharge:2kV/4kV/8kV (Direct)<br>Contact Discharge:2kV/4kV (Direct/Indirect) |
| Polarity: | Positive & Negative |
| Number of Discharge: | Air Discharge: min. 20 times at each test point<br>Contact Discharge: min. 200 times in total |
| Discharge Mode: | Single Discharge |
| Discharge Period: | 1 second minimum |

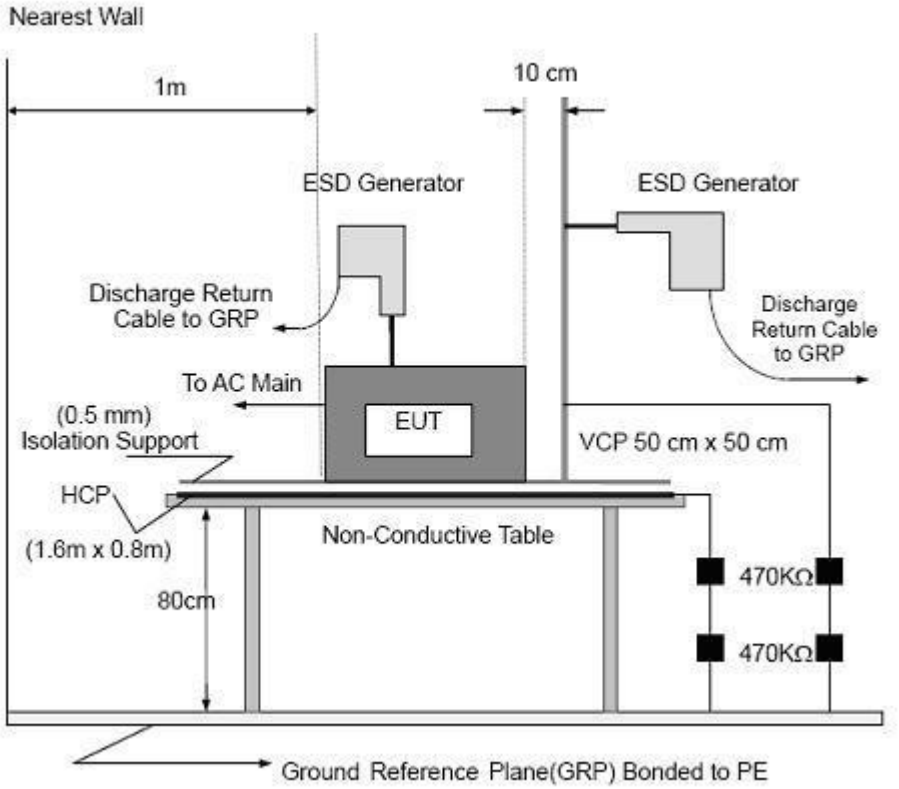
### 4.2.2 TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

a. Contact discharge was applied to conductive surfaces and coupling planes of the EUT. During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges.
If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.
Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
Horizontal Coupling Plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

b. Air discharges at insulation surfaces of the EUT.
It was at least ten single discharges with positive and negative at the same selected point.

### 4.2.3 TEST SETUP




Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.2.4 TEST RESULT

| | | | |
|---|---|---|---|
| Temperature: | 23.9℃ | Relative Humidity: | 48% |
| Pressure: | 1010hPa | Test Voltage: | 220VAC |
| Test Mode: | Mode 1 | | |

**BT TEST RESULT**

| Discharge Level | Polarity | Test Points | Contact Discharge | Air Discharge | Criterion | Test Result |
|---|---|---|---|---|---|---|
| 4 | +/- | VCP/HCP | NOTE | N/A | A | PASS |
| 2,4,8 | +/- | 1-5 | N/A | NOTE | A | PASS |

Note: The EUT function was correct during the test.
Red Dot —Air Discharged
Blue Dot —Contact Discharged

## 4.3 RS TESTING

### 4.3.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-3 |
| Required Performance | A |
| Frequency Range: | 80 MHz - 6000 MHz |
| Field Strength: | 3 V/m |
| Modulation: | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step: | 1 % of fundamental |
| Polarity of Antenna: | Horizontal and Vertical |
| Test Distance: | 3 m |
| Antenna Height: | 1.5 m |
| Dwell Time: | at least 3 seconds |

### 4.3.2 TEST PROCEDURE

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

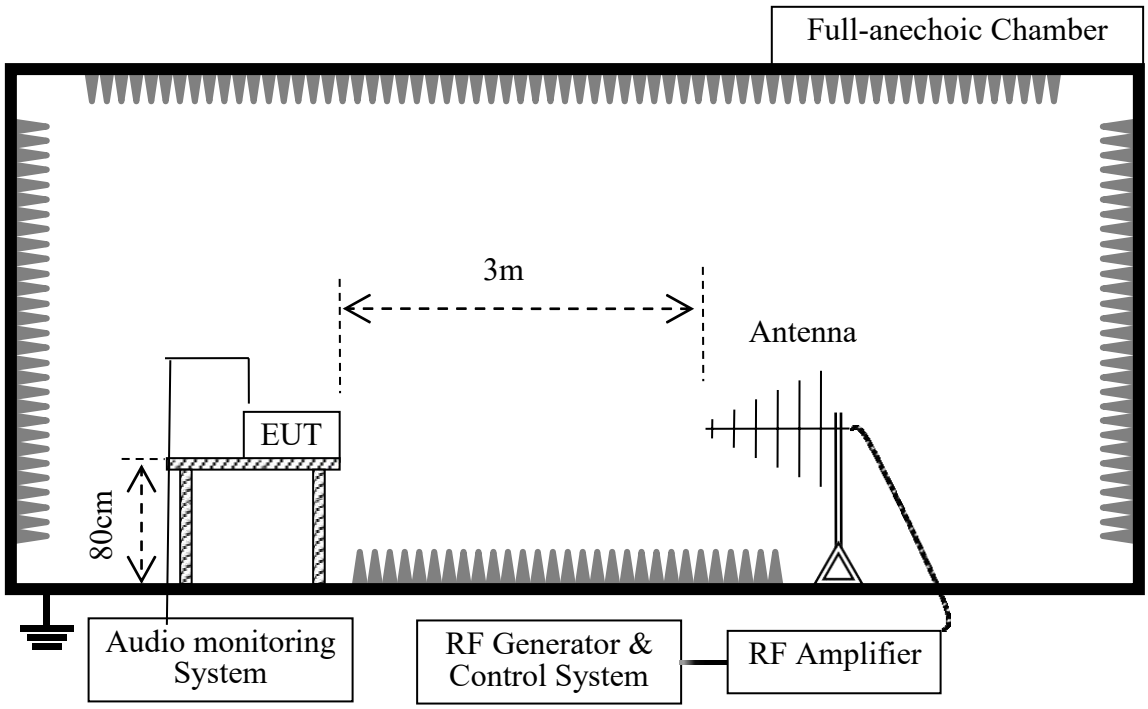
The other condition as following manner:

a. The frequency range is swept from 80 MHz to 6000 MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x $10^{-3}$ decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

b. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

c. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 4.3.3 TEST SETUP




Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

### 4.3.4 TEST RESULTS

| | | | |
|---|---|---|---|
| Temperature: | 24.9℃ | Relative Humidity: | 50% |
| Test Voltage: | 220VAC | Test Mode: | Mode 1 |

**BT TEST RESULTS**

| Frequency Range (MHz) | RF Field Position | R.F. Field Strength | Azimuth | Observation | Perform. Criteria | Results | Judgment |
|---|---|---|---|---|---|---|---|
| 80~6000 | H / V | 3 V/m (rms) AM Modulated 1000Hz, 80% | Front | **CT,CR** | **A** | **A** | **PASS** |
| | | | Rear | | | | |
| | | | Left | | | | |
| | | | Right | | | | |

Note: “A” stand for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.

*Note:*

*1) N/A - denotes test is not applicable in this test report.*

*2) Criteria A: There was no change operated with initial operating during the test.*

*3) Criteria B: The EUT function loss during the test, but self-recoverable after the test.*

*4) Criteria C: The system shut down during the test.*

# RADIO TEST REPORT

Report No: TRZJ21011228835

Issued for

ZHEJIANG IWALK TECHNOLOGY CO., LTD.

NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA

| | |
|---|---|
| **Product Name:** | Electric Scooter |
| **Brand Name:** | / |
| **Model Name:** | KS1 |
| **Series Model:** | KS1 |
| **Test Standard:** | EN 50663:2017 |

# TEST REPORT CERTIFICATION

**Applicant's name** .....: ZHEJIANG IWALK TECHNOLOGY CO., LTD.

Address .....: NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA

**Manufacture's Name** .....: ZHEJIANG IWALK TECHNOLOGY CO., LTD.

Address .....: NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA

**Product description**

Product Name .....: Electric Scooter

Brand Name .....: /

Model Name .....: KS1

Series Model .....: KS1

**Standards** .....: EN 50663:2017



**Date of Test** ..... :

Date (s) of performance of tests .....: January 12,2021 – January 19,2021

Date of Issue..... : January 19,2021

Test Result..... : **Pass**

Testing Engineer : Kein Shan

(Kein Shan )

Technical Manager : Johnson Lai

(Fohnson Lai )

Authorized Signatory : Johnson Lai

(Fohnson Lai)

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## Revision History

| Rev. | Issue Date | Report No. | Effect Page | Contents |
|---|---|---|---|---|
| 00 | January 19,2021 | TRZJ21011228835 | ALL | Initial Issue |
| | | | | |

# 1. GENERAL INFORMATION

## 1.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Product Name | Electric Scooter |
| Brand Name | / |
| Model Name | KS1 |
| Series Model | KS1 |
| Model Difference | / |
| Product Description | The EUT is Electric Scooter<br>Input voltage 100-240V<br>More details of EUT technical specification, please refer to the User's Manual. |
| Battery | Battery(rating):<br>Battery type: 36V IP54 |
| Hardware version number | N/A |
| Software version number | N/A |

Note: 1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

1.2 TEST FACTORY

Shanghai Global Testing Services Co., Ltd.
Floor 2nd, Building D-1, No. 128, Shenfu Road, Minhang District, Shanghai, China.

## 2. EN50663 REQUIREMENT

### 2.1 GENERAL INFORMATION AND LIMIT

Equipment complying with the requirements for the general public is deemed to comply with the requirements for workers without further testing.

The conformity assessment to demonstrate equipment compliance shall be made according to EN 62479:2010, 4.1 and Clause 6.

If routes B, C or D of 4.1 of EN 62479:2010 are followed then the values of Pmax, as described in 4.2 of EN 62479:2010 and given in Annex A of EN 62479:2010, shall be meet in below Table

| Exposure tier | Region of body | Pmax(mW) |
|---|---|---|
| General public | Head and trunk | 20 |
| | Limbs | 40 |
| Workers | Head and trunk | 100 |
| | Limbs | 200 |

A. Typical usage, installation and the physical characteristics of equipment make it inherently compliant with the applicable EMF exposure levels such as those listed in the bibliography. This low-power equipment includes unintentional (or non-intentional) radiators, for example incandescent light bulbs and audio/visual (A/V) equipment, information technology equipment (ITE) and multimedia equipment (MME) that does not contain radio transmitters.

NOTE Equipment is described as A/V equipment, ITE or MME if its main use is playback/recording of music, voice or images, or processing of digital information.

B. The input power level to electrical or electronic components that are capable of radiating electromagnetic energy in the relevant frequency range is so low that the available antenna power and/or the average total radiated power cannot exceed the low-power exclusion level defined in 4.2.

C. The available antenna power and/or the average total radiated power are limited by product standards for transmitters to levels below the low-power exclusion level defined in 4.2.

D. Measurements or calculations show that the available antenna power and/or the average total radiated power are below the low-power exclusion level defined in 4.2.

## 3. RESULT

The available antenna power of this EUT is **3.00mW (4.77dBm),** the power are below the low-power exclusion level defined in 4.2(Pmax: 20mW).

# TECHNICAL CONSTRUCTION FILE

# EN 300328 V2.1.1:2016

| | |
|---|---|
| Report Reference No. .....: | TRZJ21011228835 |
| Tested by ( name + signature).....: | Stephen Zhan / Testing Engineer |
| Approved by (name + signature).....: | Cosco Yu / Technical Manager |
| Date of issue.....: | January 19,2021 |
| Testing Laboratory Name.....: | Shanghai Global Testing Services Co., Ltd. |
| Address: .....: | Floor 2nd, Building D-1, No. 128, Shenfu Road, Minhang District, Shanghai, China. |
| Applicant's name.....: | ZHEJIANG IWALK TECHNOLOGY CO., LTD. |
| Address: .....: | NO. 59 JUXING TECHNOLOGY PARK, JIAOJIANG DISTRICT, TAIZHOU CITY, ZHEJIANG, PROVINCE, CHINA |
| Manufacturer's name.....: | Same as applicant |
| Address: .....: | |
| Test specification: | |
| Standard.....: | EN 300328 V2.1.1:2016 |
| Test procedure.....: | CE |
| Procedure deviation.....: | N/A |
| Non-standard test method.....: | N/A |
| Test item description.....: | Electric Scooter |
| Trade Mark.....: | \ |
| Model/Type reference.....: | KS1 |

| Copy of marking plate | |
|---|---|
| CE | |

Summary of testing:

The submitted sample compliance with the standard EN 300328 V2.1.1:2016.

**Possible test case verdicts:**

| | |
|---|---|
| -test case does not apply to the test object……..: | N/A |
| -test object does meet the requirement.....: | P (Pass) |
| -test object does not meet the requirement……: | F (Fail) |

**Testing**……..……..:

| | |
|---|---|
| Date of receipt of test item……..: | January 12,2021 |
| Date(s) of performance of tests……...: | January 12,2021 to January 19,2021 |

**General remarks:**

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

This test report includes

Annex I: Photo Documentation, 9 page(s)

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Description Page

# 1. Test Summary

| Standard Clause | Description of test | Test Applicability | Result |
|---|---|---|---|
| 4.3.2.2 | RF Output power(Conducted) | Applicable | Pass |
| | RF Output power(Radiated) [1] | Not Applicable | N/A |
| 4.3.2.3 | Power Spectral Density(Conducted) | Applicable | Pass |
| | Power Spectral Density(Radiated) [1] | Not Applicable | N/A |
| 4.3.2.4 | Duty Cycle,Tx-sequence,Tx-gap(Conducted) | Applicable | Pass |
| | Duty Cycle,Tx-sequence,Tx-gap(Radiated) [1] | Not Applicable | N/A |
| 4.3.2.5 | Medium Utilization factor(Conducted) | Applicable | Pass |
| | Medium Utilization factor(Radiated) [1] | Not Applicable | N/A |
| 4.3.2.6 | Adaptivity[2] | Not Applicable | N/A |
| 4.3.2.7 | Occupied Channel Bandwidth(Conducted) | Applicable | Pass |
| | Occupied Channel Bandwidth(Radiated) [1] | Not Applicable | N/A |
| 4.3.2.8 | Transmitter unwanted emissions in the out-of-band domain (Conducted) | Applicable | Pass |
| | Transmitter unwanted emissions in the out-of-band domain (Radiated) [1] | Not Applicable | N/A |
| 4.3.2.9 | Transmitter unwanted emissions in the spurious domain (Conducted) | Applicable | Pass |
| | Transmitter unwanted emissions in the spurious domain (Radiated) | Applicable | Pass |
| 4.3.2.10 | Receiver Spurious Emissions(Conducted) | Applicable | Pass |
| | Receiver Spurious Emissions(Radiated) | Applicable | Pass |
| 4.3.2.11 | Receiver Blocking[2] | Not Applicable | N/A |
| 4.3.2.12 | Geo-location capability[3] | Not Applicable | N/A |

Note 1: The item shall only be used for integral antenna equipment that does not have a temporary antenna connector provided. But EUT has a temporary antenna connector, these standard clauses don't apply to the EUT.( N/A)

Note 2: The item does not apply to non-adaptive equipment. And EUT is the non-adaptive equipment. So these standard clauses don't apply to the EUT. ( N/A)

Note 4: The item only applies to equipment with geo-location capability. EUT is not with geo-location capability. So this standard clause doesn't apply to EUT. ( N/A)

# 2. General Information

## 2.1. EUT Description

| | |
|---|---|
| Product Name | : Electric Scooter |
| Trade Name | : / |
| Model No. | : KS1 |
| Type of Modulation | : Modbus |
| Antenna Type | : *** |
| oldered on PCB | |
| Frequency Range | : 2.4GHz |
| Channel Separation | : 1MHz |
| Channel Number | : 1 |
| Antenna Gain | : -5 dBi |

## 2.2. Operational Description

The information contained within this report is intended to show verification of compliance of the EUT to the requirements of ETSI EN 300328 **Electromagnetic compatibility and Radio spectrum Matters (ERM);Wideband transmission systems;Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques;Harmonized EN covering the essential requirements of article 3.2 of the RED Directive**.

## 2.3. Test System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product | | Manufacturer | Model | Serial No. | Due Date |
|---|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A | MY54170284 | 2021.12.23 |
| 2 | Shielding Room | ChengYu | 5×4×3(m) | CR | 2021.12.23 |
| 3 | Spectrum Analyzer | R&S | FSU26 | 200880 | 2021.12.23 |
| 4 | 3m Semi-anechoic Chamber | ChengYu | 9.2×6.25×6.15(m) | SAR | 2021.12.23 |
| 5 | BroadBand Log Antenna | Schwarzbeck | VULB 9163 | 9163-561 | 2021.12.23 |
| 6 | Broadband Horn Antenna | Schwarzbeck | BBHA 9120 D | 9120D-1033 | 2021.12.23 |

## 2.4. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been calculated in accordance with TR 100 028-1.

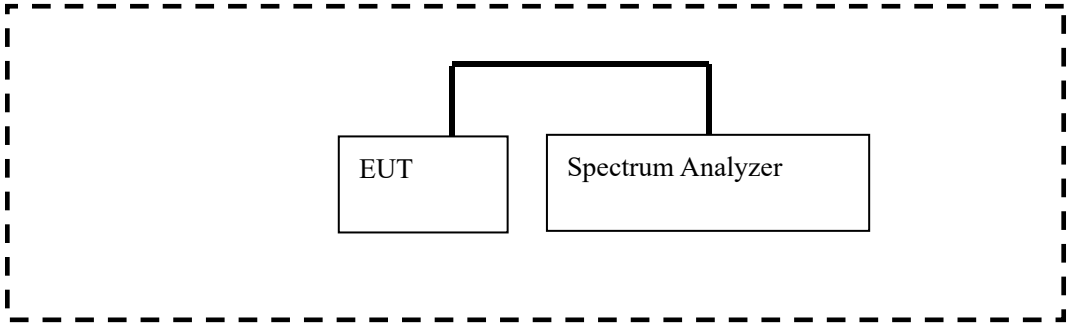
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

This lab's measurement uncertainty ULab, is low than Table 7 : Maximum measurement uncertainty of ETSI EN 300 328, therefore compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.

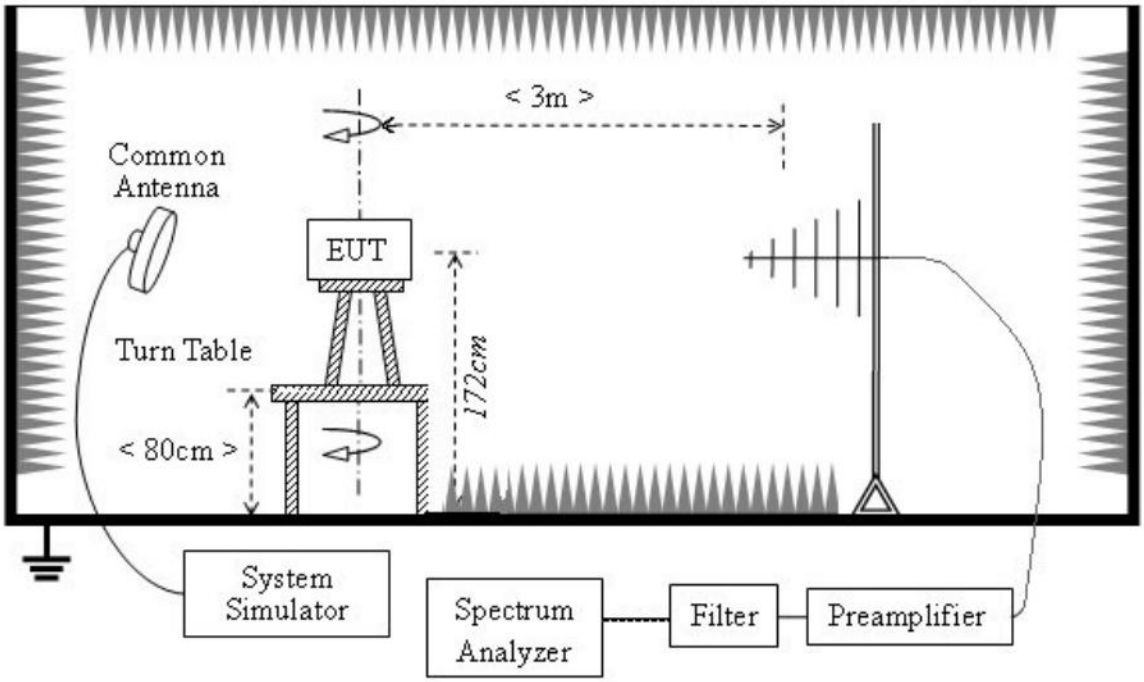
| | |
|---|---|
| Radio frequency | ±1.0x10$^{-7}$ |
| Total RF power, conducted | ±0.48dB |
| RF power density, conducted | ±0.48dB |
| Humidity | ±3% |
| Temperature | ±2.0°C |
| DC and low frequency voltages | ±0.04% |

## 2.5. Configuration of tested System

(1) Configuration of Conducted measurement




(2) Configuration of Radiated measurement



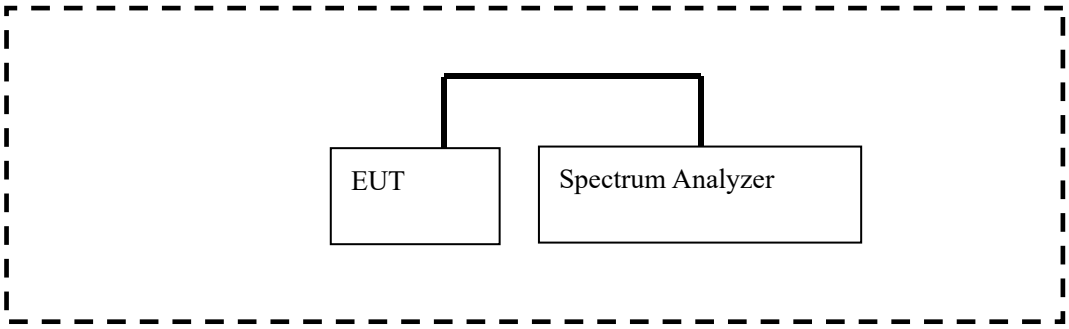
# 3. RF Output Power(Conducted)

## 3.1. Test Equipment List

The following test equipment are used during testing the RF Output Power:

| Item | Instrument | Manufacturer | Model/Serial No. | Due Date |
|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A/ MY54170284 | 2021.12.23 |

## 3.2. Test Setup




## 3.3. Limits

The maximum RF output power for non-adaptive Frequency Hopping equipment shall be declared by the supplier. The supplier declared that the maximum RF output power was 0dBm .

## 3.4. Test Procedure

Use the following spectrum analyzer setting:
CH1: Center Frequency 2401MHz
Span : 1.5 MHz
Resolution Bandwidth (RBW) : Auto
Video Bandwidth (VBW) : ≥RBW
Sweep : Auto
Trace : Max Hold
Waiting for the trace stabilizing and save the result image.

## 3.5. EUT Operation

See chapter 2.2 of this test report.

## 3.6. Test Specification

According to EN 300328 V2.1.1:2016 4.3.2.2 RF output power.

### 3.7. Test Result

$$p = A + G + Y + c$$

P is the RF output Power; A is the measured power got from the PXA; G is the appliable antenna assemble gain in dBi; Y is the additional beamforming gain; C is the cable loss in dB.

| Frequency Point(MHz) | A(dBm) | G(dBi) | Y(dBm) | C(dB) | P(dBm) | Test Result |
|---|---|---|---|---|---|---|
| 2401(CH1) | -10.02 | -5 | 0 | 0.69 | -14.33 | Pass |

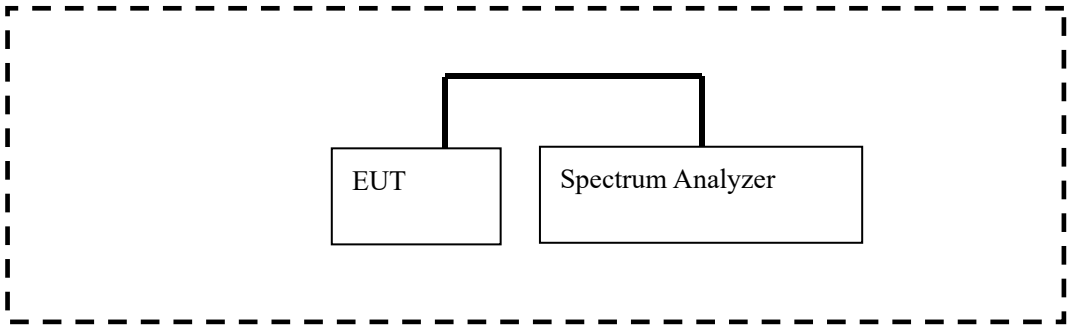
## 4. Power Spectral Density(Conducted)

### 4.1. Test Equipment List

The following test equipment are used during testing the Power Spectral Density:

| Item | Instrument | Manufacturer | Model/Serial No. | Due Date |
|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A/ MY54170284 | 2021.12.23 |

### 4.2. Test Setup




### 4.3. Limits

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm/MHz.

### 4.4. Test Procedure

The EUT is in TX mode.Connect the EUT to PXAand test the mouse of CH1.Use the following spectrum analyzer setting:

CH1: Center Frequency 2401MHz

Span : 1.5 MHz

Resolution Bandwidth (RBW) : Auto

Video Bandwidth (VBW) : ≥RBW

Sweep : Auto

Trace : Max Hold

Waiting for the trace stabilizing and save the result image.

## 4.5. EUT Operation

See chapter 2.2 of this test report.

## 4.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 4.3.2.3 Power Spectral Density.

## 4.7. Test Result

$$psd = A + c$$

PSD is the Power Spectral Density; A is the measured power spectral density in dBm; C is the cable loss in dB.

| Frequency Point(MHz) | A(dBm) | C(dB) | PSD(dBm) | Test Result |
|---|---|---|---|---|
| 2401(CH1) | -8.727 | 0.69 | -8.037 | Pass |

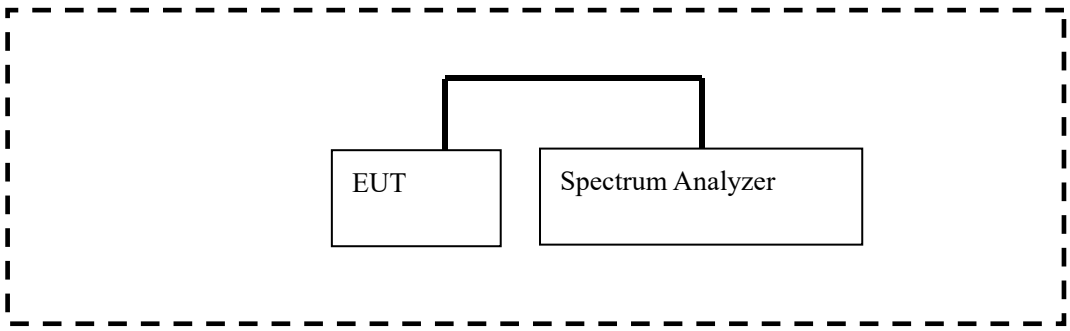
# 5. Duty Cycle,Tx-sequence,Tx-gap(Conducted)

## 5.1. Test Equipment List

The following test equipment are used during testing the Duty Cycle,Tx-sequence and Tx-gap:

| Item | Instrument | Manufacturer | Model/Serial No. | Due Date |
|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A/ MY54170284 | 2021.12.23 |

## 5.2. Test Setup



## 5.3. Limits

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier. The supplier declared that the maximum value of Duty Cycle is 10%.The Tx-sequence time shall be equal to or less than 10 ms. The minimum Tx-gap time following a Tx-sequence shall be equal to the duration of that proceeding Tx-sequence with a minimum of 3.5 ms.

## 5.4. Test Procedure

The EUT is in TX mode.Connect the EUT to the PXA and test the mouse of CH1 repectively.Use the following spectrum analyzer setting:

CH1: Center Frequency 2401MHz
Span : 0 Hz
Resolution Bandwidth (RBW) : 1.0 MHz
Video Bandwidth (VBW) : 3.0 MHz
Sweep Points: >8350
Trace: Max Hold
Waiting for the trace stabilizing and save the result image.

## 5.5. EUT Operation

See chapter 2.2 of this test report.

## 5.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 4.3.2.4 Duty Cycle, Tx-sequence, Tx-gap.

## 5.7. Test Result

| Frequency Point(MHz) | Duty Cycle | Tx-sequence(ms) | Tx-gap(ms) | Test Result |
|---|---|---|---|---|
| 2400(CH1) | 5.38% | 1.09 | 21.14 | Pass |

CH1's duty cycle,Tx-sequence and Tx-gap are shown.

$$Duty-cycle=\frac{(30.06-28.97)ms\times 5}{101.3ms}\times 100\%=5.38\%$$

$$TX-sequence=30.06ms-28.97ms=1.09ms$$

$$TX-gap=51.2ms-30.06ms=21.14ms$$

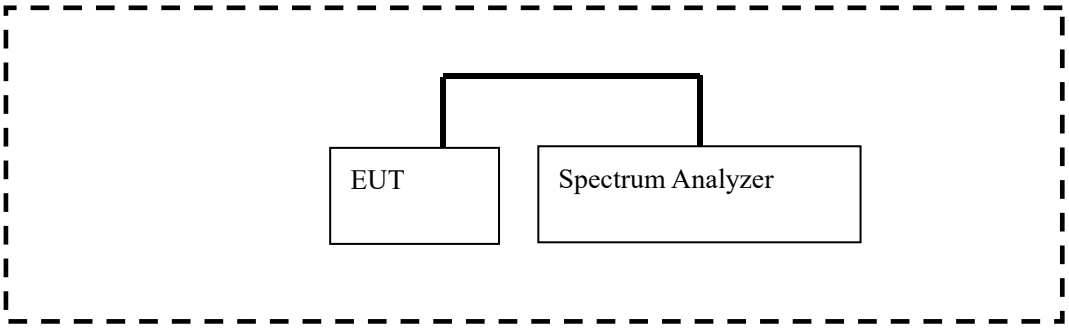
# 6. Medium Utilization factor(Conducted)

## 6.1. Test Equipment List

The following test equipments are used during testing the Medium Utilization (MU) factor:

| Item | Instrument | Manufacturer | Type No./Serial No. | Due Date |
|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A/ MY54170284 | 2021.12.23 |

## 6.2. Test Setup




## 6.3. Limits

For non-adaptive equipment using wide band modulations other than FHSS, the maximum Medium Utilization factor shall be less than 10 %.

## 6.4. Test Procedure

The EUT is in TX mode. Use the following spectrum analyzer setting:
CH1: Center Frequency 2401MHz
Span: 1.5 MHz
Resolution Bandwidth (RBW): Auto
Video Bandwidth (VBW): ≥RBW
Sweep : Auto
Trace: Max Hold
Waiting for the trace stabilizing and save the result image.

## 6.5. EUT Operation

See chapter 2.2 of this test report.

## 6.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 4.3.2.5 Medium Utilization (MU) factor.

## 6.7. Test Result

$$MU = (P / 100mw) \times DC$$

MU is Medium Utilization.P is the RF output power in mW tested in chapter 3.7 of this test report.DC is the Duty Cycle tested in chapter 5.7 of this test report.

| Frequency Point(MHz) | P(dBm) | P(mw) | Duty Cycle(%) | MU(%) | Test Result |
|---|---|---|---|---|---|
| 2401(CH1) | -14.33 | 0.037 | 5.38 | 0.20 | Pass |

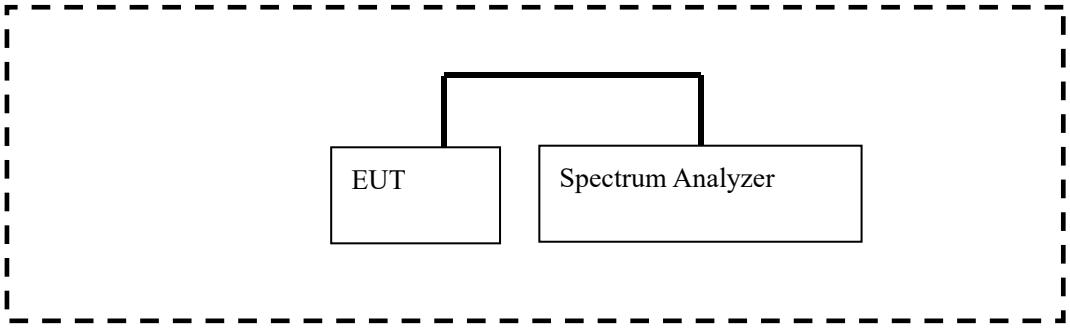
# 7. Occupied Channel Bandwidth(Conducted)

## 7.1. Test Equipment List

The following test equipment are used during testing the Occupied Channel Bandwidth:

| Item | Instrument | Manufacturer | Model/Serial No. | Due Date |
|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A/ MY54170284 | 2021.12.23 |

## 7.2. Test Setup




## 7.3. Limits

This radio equipment is capable of operating in the band 2.4 GHz.

## 7.4. Test Procedure

The EUT is in TX mode. Use the following spectrum analyzer settings:
Start Frequency:2.4 GHz
Stop Frequency:2.46GHz
Resolution Bandwidth (RBW) :620 KHz
Video Bandwidth (VBW) :1.8 MHz
Sweep time : 1ms
Trace : Max Hold
Waiting for the trace stabilizing and save the result image.

## 7.5. EUT Operation

See chapter 2.2 of this test report.

## 7.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 4.3.2.7 Occupied Channel Bandwidth.

## 7.7. Test Result

Occupied Channel Bandwidth is from 2.401GHz, which are shown in Fig.16. This result is less than limit,Pass.

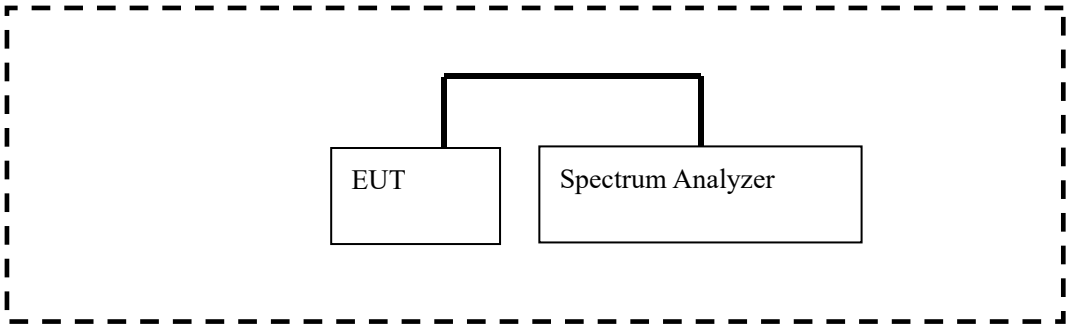
# 8. Transmitter unwanted emissions in the out of band domain(Conducted)

## 8.1. Test Equipment List

The following test equipment are used during testing the Transmitter unwanted emissions in the out-of-band domain:

| Item | Instrument | Manufacturer | Type No./Serial No. | Due Date |
|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A/ MY54170284 | 2021.12.23 |

## 8.2. Test Setup




## 8.3. Limits

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in t Fig.18.

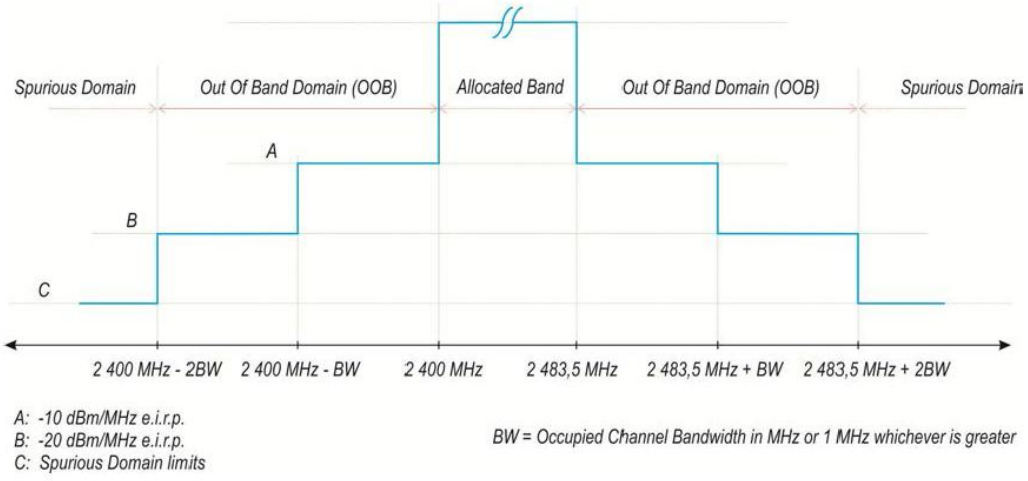



Fig.18

## 8.4. Test Procedure

The EUT is in TX mode. Use the following spectrum analyzer settings:
Start Frequency:2.4835GHz/2.4885GHz/2.395GHz/2.39GHz
Stop Frequency:2.4885GHz/2.4935GHz/2.4GHz/2.395GHz
Resolution Bandwidth (RBW) :1.0 MHz
Video Bandwidth (VBW) :3.0 MHz
Sweep time : Auto
Sweep points:40001
Trace : Max Hold
Waiting for the trace stabilizing.

## 8.5. EUT Operation

See chapter 2.2 of this test report.

## 8.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 4.3.2.8 Transmitter unwanted emissions in the out-of-band domain.

## 8.7. Test Result

| Frequency Point(MHz) | Test Item Domain | Test Value | Test Result |
|---|---|---|---|
| 2401(CH 1) | 2483.5MHz to 2488.5MHz | < -10dBm | Pass |
| | 2488.5MHz to 2493.5MHz | < -20dBm | Pass |
| | 2395MHz to 2400MHz | < -10dBm | Pass |
| | 2390MHz to 2395MHz | < -20dBm | Pass |
| 2480(CH 79) | 2483.5MHz to 2488.5MHz | < -10dBm | Pass |
| | 2488.5MHz to 2493.5MHz | < -20dBm | Pass |
| | 2395MHz to 2400MHz | < -10dBm | Pass |
| | 2390MHz to 2395MHz | < -20dBm | Pass |

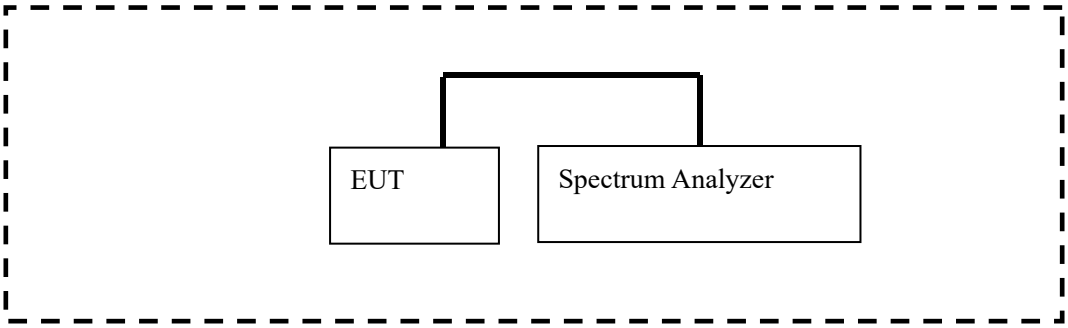
# 9. Transmitter unwanted emissions in the spurious domain(Conducted)

## 9.1. Test Equipment List

The following test equipment are used during testing the transmitter unwanted emissions in the spurious domain:

| Item | Instrument | Manufacturer | Model/Serial No. | Due Date |
|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A/ MY54170284 | 2021.12.23 |

## 9.2. Test Setup




## 9.3. Limits

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in Tab.1.

Tab.1

| Frequency range | Maximum power | Bandwidth |
|---|---|---|
| 30MHz to 47MHz | -36dBm | 100KHz |
| 47MHz to 74MHz | -54dBm | 100KHz |
| 74MHz to87.5MHz | -36dBm | 100KHz |
| 87.5MHz to 118MHz | -54dBm | 100KHz |
| 118MHz to 174MHz | -36dBm | 100KHz |
| 174MHz to 230MHz | -54dBm | 100KHz |
| 230MHz to 470MHz | -36dBm | 100KHz |
| 470MHz to 862MHz | -54dBm | 100KHz |
| 862MHz to 1GHz | -36dBm | 100KHz |
| 1GHz to 12.75GHz | -30dBm | 1MHz |

## 9.4. Test Procedure

The EUT is in TX mode. Use the following spectrum analyzer setting:
Frequency Range:30MHz-1GHz/1GHz-12.75GHz
Resolution Bandwidth (RBW) :100KHz(<1GHz)/1.0 MHz(>1GHz)
Video Bandwidth (VBW) :300KHz(<1GHz)/3.0 MHz(>1GHz)
Sweep time : Auto
Sweep points:40001
Trace : Max Hold
Waiting for the trace stabilizing and save the result image.

## 9.5. EUT Operation

See chapter 2.2 of this test report.

## 9.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 4.3.2.9 Transmitter unwanted emissions in the spurious domain.

## 9.7. Test Result

| Channel | Test Item Domain | Test Result |
|---|---|---|
| CH1 | 30MHz to 1GHz | Pass |
| | 1GHz to 12.75GHz | Pass |

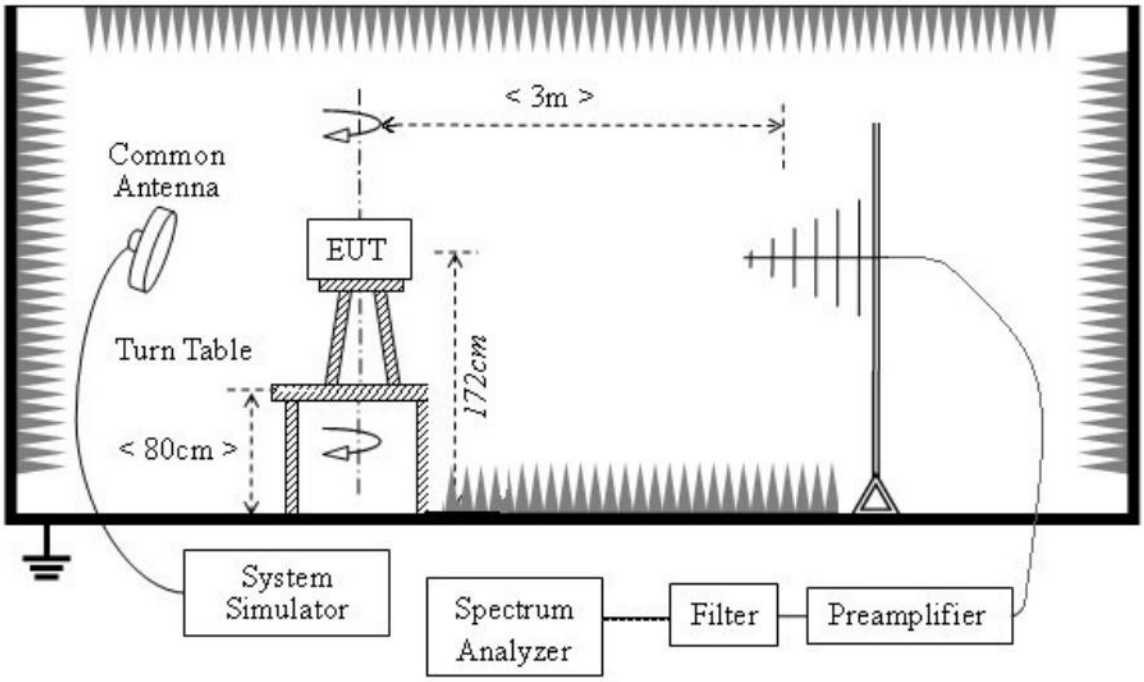
# 10. Transmitter unwanted emissions in the spurious domain(Radiated)

## 10.1. Test Equipment List

The following test equipments are used during testing the Transmitter unwanted emissions in the spurious domain:

| Item | Instrument | Manufacturer | Type No./Serial No. | Due Date |
|---|---|---|---|---|
| 1 | Shielding Room | ChengYu | 5×4×3(m)/ CR | 2021.12.23 |
| 2 | Spectrum Analyzer | R&S | FSU26/200880 | 2021.12.23 |
| 3 | 3m Semi-anechoic Chamber | ChengYu | 9.2×6.25×6.15(m)/ SAR | 2021.12.23 |
| 4 | BroadBand Log Antenna | Schwarzbeck | VULB 9163/9163-561 | 2021.12.23 |
| 5 | Broadband Horn Antenna | Schwarzbeck | BBHA 9120 D/9120D-1033 | 2021.12.23 |

## 10.2. Test Setup




## 10.3. Limits

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in Tab.2.

Tab.2

| Frequency range | Maximum power | Bandwidth |
|---|---|---|
| 30MHz to 47MHz | -36dBm | 100KHz |
| 47MHz to 74MHz | -54dBm | 100KHz |
| 74MHz to87.5MHz | -36dBm | 100KHz |
| 87.5MHz to 118MHz | -54dBm | 100KHz |
| 118MHz to 174MHz | -36dBm | 100KHz |
| 174MHz to 230MHz | -54dBm | 100KHz |
| 230MHz to 470MHz | -36dBm | 100KHz |
| 470MHz to 862MHz | -54dBm | 100KHz |
| 862MHz to 1GHz | -36dBm | 100KHz |
| 1GHz to 12.75GHz | -30dBm | 1MHz |

## 10.4. Test Procedure

The EUT is in TX mode. The Test is taken in a SAR following the guidance of EN 300328 v1.9.1 Annex C

## 10.5. EUT Operation

See chapter 2.2 of this test report.

## 10.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 4.3.2.9 Transmitter unwanted emissions in the spurious domain.

## 10.7. Test Result

Vertical Polarization:

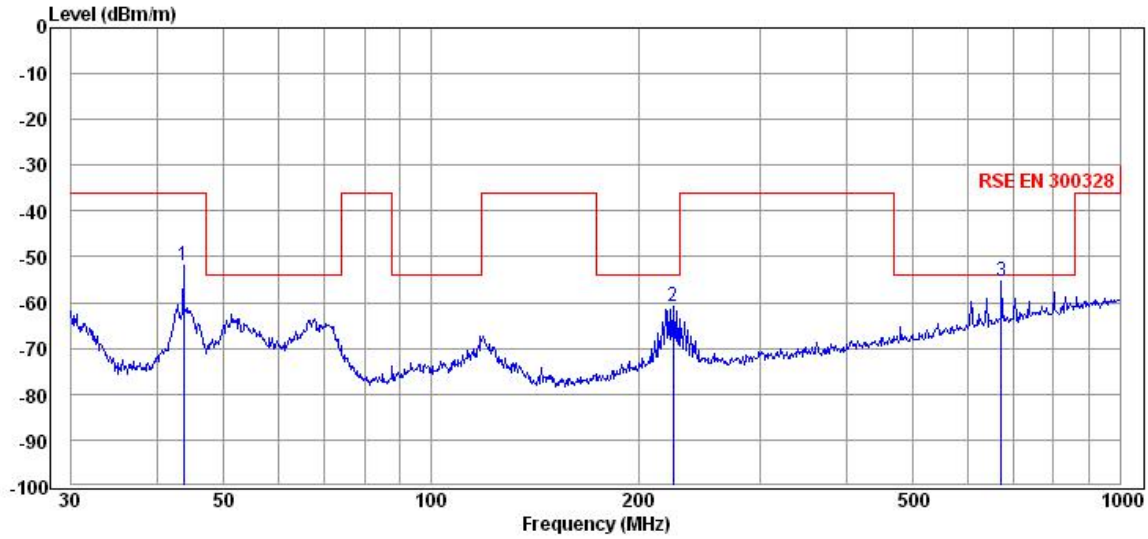



Fig.31

| Freq | Reading | C.F | Result | Limit | Margin |
|---|---|---|---|---|---|
| MHz | dBm | dB | dBm/m | dBuV/m | dB |
| 43.66 | -80.51 | 28.78 | -51.73 | -36.00 | 15.73 |
| 224.52 | -88.60 | 27.87 | -60.73 | -54.00 | 6.73 |
| 672.84 | -92.89 | 37.50 | -55.39 | -54.00 | 1.39 |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

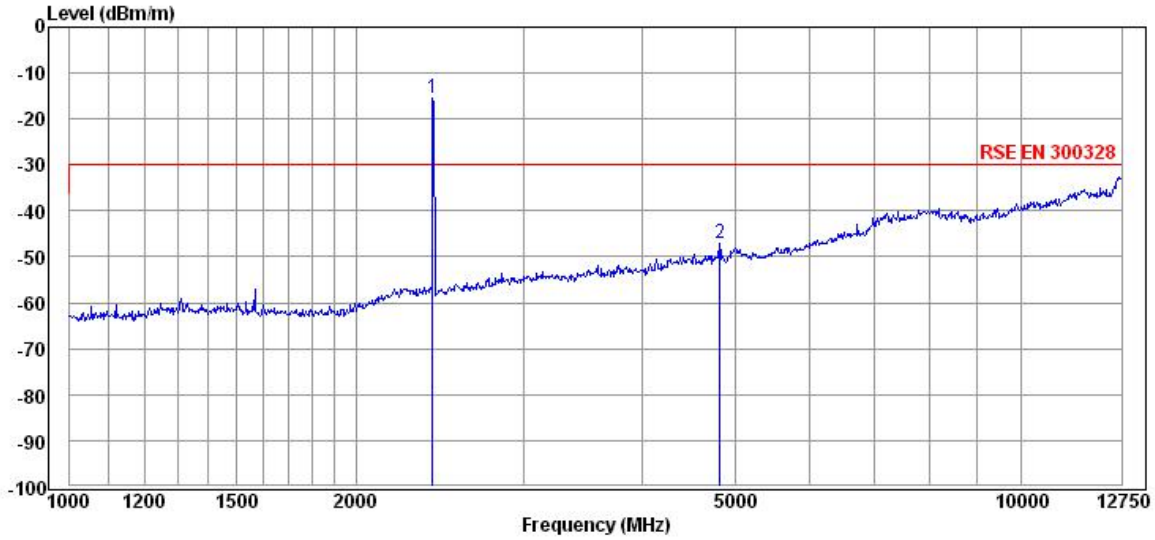



Fig.32

| Freq | Reading | C.F | Result | Limit | Margin | Detector |
|---|---|---|---|---|---|---|
| MHz | dBm | dB | dBm | dBuV | dB | |
| 2406.58 | -24.56 | 9.11 | -15.45 | -30.00 | -14.55 | Peak |
| 4821.76 | -65.39 | 18.34 | -47.05 | -30.00 | 17.05 | Peak |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Horizonal polarization:

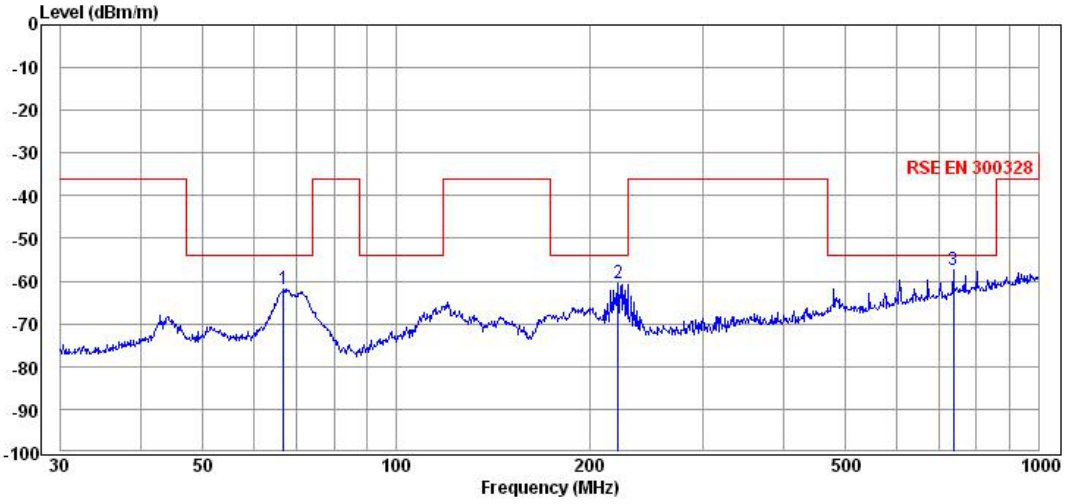



Fig.33

| Freq | Reading | C.F | Result | Limit | Margin |
|---|---|---|---|---|---|
| MHz | dBm | dB | dBm/m | dBuV/m | dB |
| 66.73 | -87.69 | 25.76 | -61.93 | -54.00 | 7.93 |
| 221.39 | -88.11 | 27.52 | -60.59 | -54.00 | 6.59 |
| 737.07 | -95.78 | 38.56 | -57.22 | -54.00 | 3.22 |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

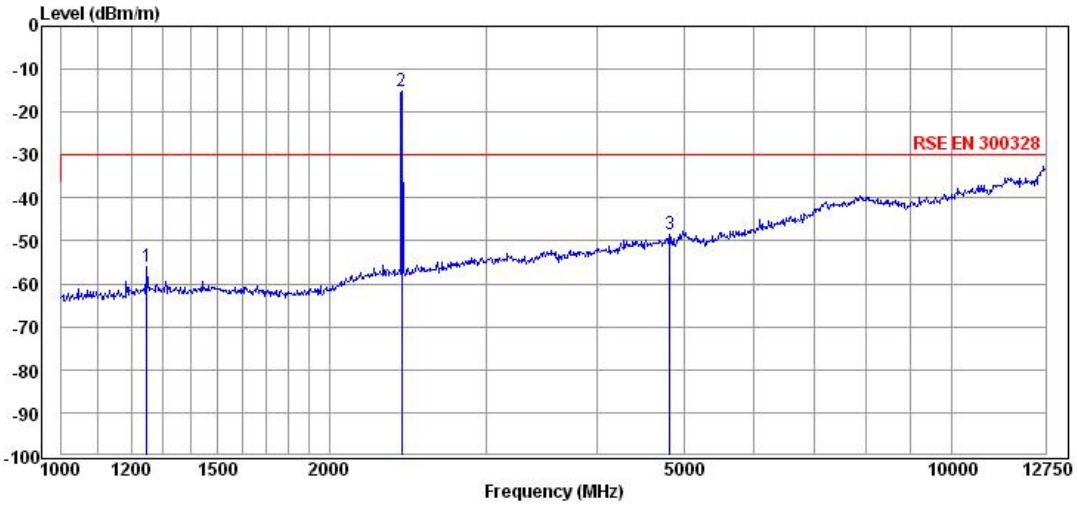



Fig.34

| Freq | Reading | C.F | Result | Limit | Margin | Detector |
|---|---|---|---|---|---|---|
| MHz | dBm | dB | dBm | dBuV | dB | |
| 1247.90 | -60.36 | 4.22 | -56.14 | -30.00 | 26.14 | Peak |
| 2412.72 | -24.32 | 9.13 | -15.19 | -30.00 | -14.81 | Peak |
| 4821.76 | -66.64 | 18.34 | -48.30 | -30.00 | 18.30 | Peak |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

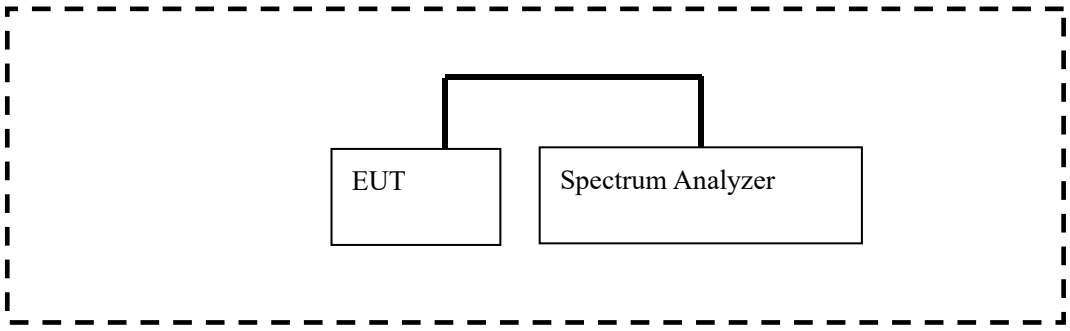
# 11. Receiver spurious emissions(Conducted)

## 11.1. Test Equipment List

The following test equipment are used during testing the receiver spurious emissions:

| Item | Instrument | Manufacturer | Model/Serial No. | Due Date |
|---|---|---|---|---|
| 1 | PXA Signal Analyzer | Aglient | N9030A/ MY54170284 | 2021.12.23 |

## 11.2. Test Setup




## 11.3. Limits

The receiver spurious emissions shall not exceed the values given in Tab.3.

Tab.3

| Frequency range | Maximum power | Bandwidth |
|---|---|---|
| 30MHz to 1GHz | -57dBm | 100KHz |
| 1GHz to 12.75GHz | -47dBm | 1MHz |

## 11.4. Test Procedure

The EUT is in RX mode. Use the following spectrum analyzer setting:
Frequency Range: 30MHz-1GHz/1GHz-12.75GHz
Resolution Bandwidth (RBW) : 100KHz(<1GHz)/1.0 MHz(>1GHz)
Video Bandwidth (VBW) : 300KHz(<1GHz)/3.0 MHz(>1GHz)
Sweep time : Auto
Sweep points: 40001
Trace : Max Hold
Waiting for the trace stabilizing and save the result image.

## 11.5. EUT Operation

See chapter 2.2 of this test report.

## 11.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 4.3.2.10 Receiver spurious emissions.

## 11.7. Test Result

| Channel | Test Item Domain | Test Result |
|---|---|---|
| CH1 | 30MHz to 1GHz | Pass |
| | 1GHz to 12.75GHz | Pass |

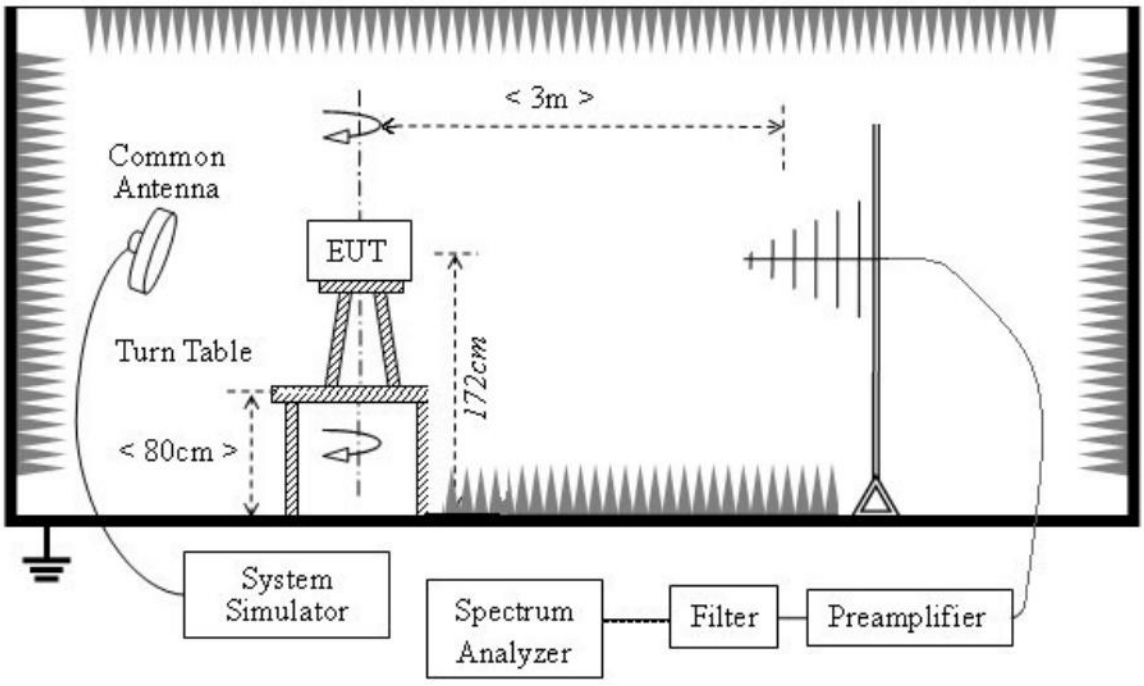
# 12. Receiver spurious emissions(Radiated)

## 12.1. Test Equipment List

The following test equipments are used during testing the receiver spurious emissions:

| Item | Instrument | Manufacturer | Model/Serial No. | Due Date |
|---|---|---|---|---|
| 1 | Shielding Room | ChengYu | 5×4×3(m)/ CR | 2021.12.23 |
| 2 | Spectrum Analyzer | R&S | FSU26/200880 | 2021.12.23 |
| 3 | 3m Semi-anechoic Chamber | ChengYu | 9.2×6.25×6.15(m)/ SAR | 2021.12.23 |
| 4 | BroadBand Log Antenna | Schwarzbeck | VULB 9163/9163-561 | 2021.12.23 |
| 5 | Broadband Horn Antenna | Schwarzbeck | BBHA 9120 D/9120D-1033 | 2021.12.23 |

## 12.2. Test Setup



## 12.3. Limits

The Receiver spurious emissions shall not exceed the values in Tab.4.

Tab.4

| Frequency range | Maximum power | Bandwidth |
|---|---|---|
| 30MHz to 1GHz | -57dBm | 100KHz |
| 1GHz to 12.75GHz | -47dBm | 1MHz |

## 12.4. Test Procedure

The EUT is in RX mode. The Test is taken in a SAR following the guidance of EN 300328 v1.9.1 Annex C.

## 12.5. EUT Operation

See chapter 2.2 of this test report.

## 12.6. Test Specification

According to ETSI EN 300328 V2.1.1:2016 Receiver spurious emissions.

## 12.7. Test Result

Vertical polarization:

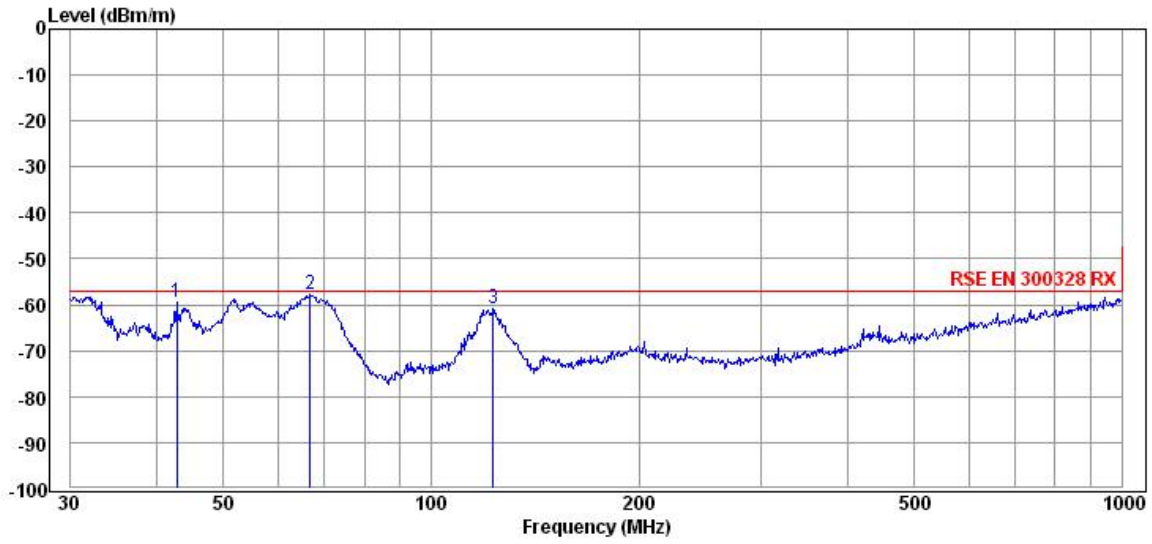



Fig.39

| Freq | Reading | C.F | Result | Limit | Margin |
|---|---|---|---|---|---|
| MHz | dBm | dB | dBm/m | dBuV/m | dB |
| 42.75 | -88.36 | 28.77 | -59.59 | -57.00 | 2.59 |
| 66.73 | -83.54 | 25.76 | -57.78 | -57.00 | 0.78 |
| 122.83 | -86.04 | 25.21 | -60.83 | -57.00 | 3.83 |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

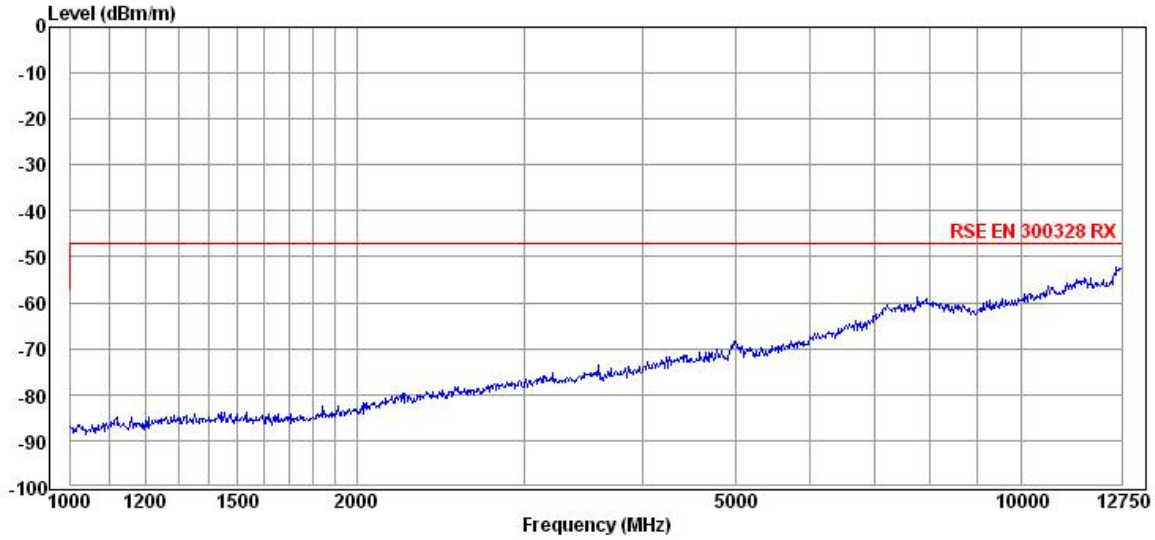



Fig.40

Horizontal polarization:

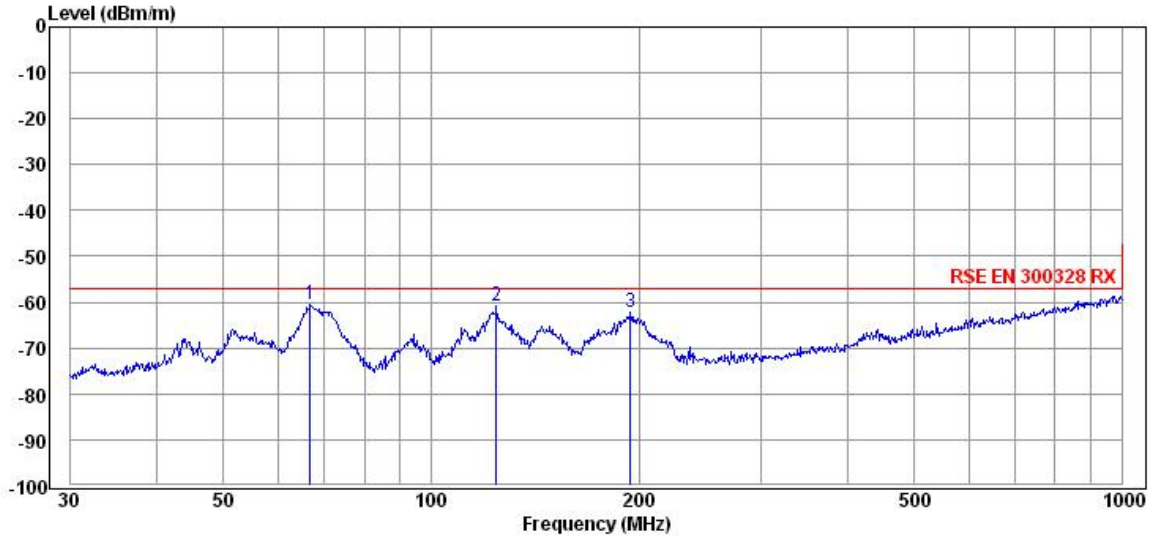



Fig.41

| Freq | Reading | C.F | Result | Limit | Margin |
|---|---|---|---|---|---|
| MHz | dBm | dB | dBm/m | dBuV/m | dB |
| 66.73 | -86.38 | 25.76 | -60.62 | -57.00 | 3.62 |
| 124.13 | -86.15 | 25.22 | -60.93 | -57.00 | 3.93 |
| 194.45 | -89.36 | 27.09 | -62.27 | -57.00 | 5.27 |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

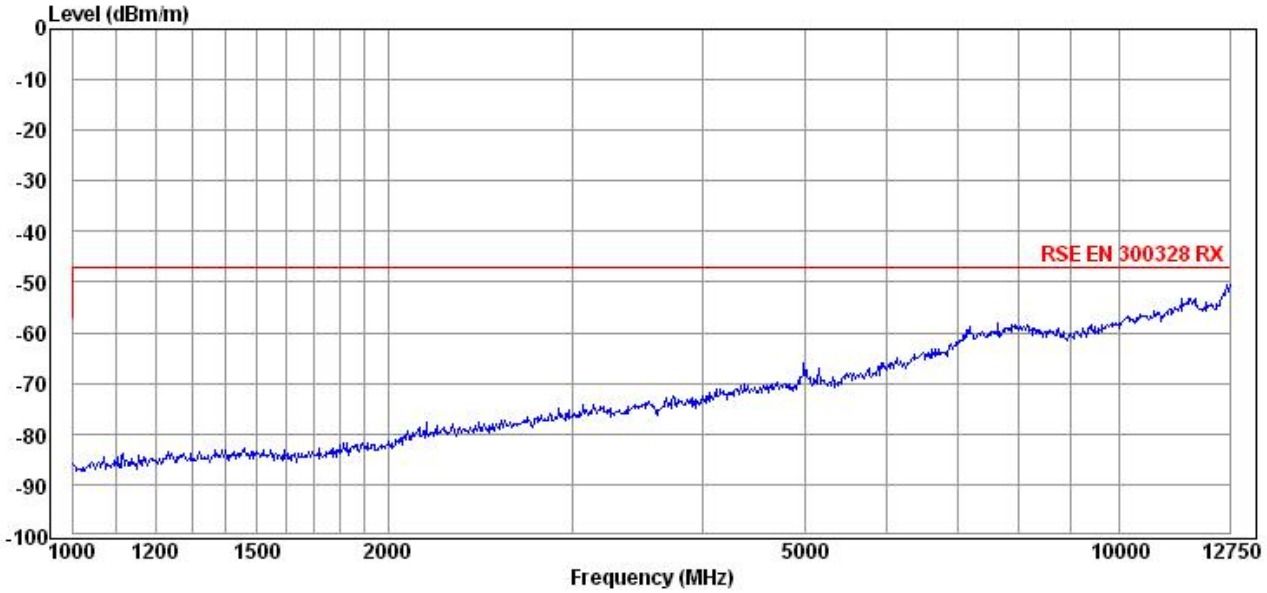

Level (dBm/m)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
RSE EN 300328 RX
1000
1200
1500
2000
5000
10000
12750
Frequency (MHz)

Fig.42

Type of equipment, model: Electric Scooter, KS1

Details of:

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Details of:

View:

[X] general

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Details of:

View:

[X] general

[ ] front

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- End of Annex I -

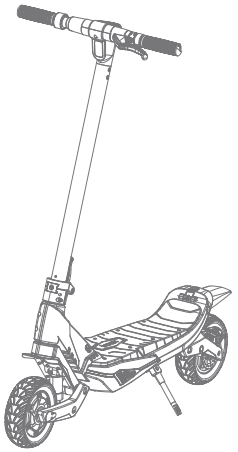
www.zjiwalk.com
Zhejiang Iwalk Technology Co., Ltd.
No.59, Juxing Technology Park, Jiaojiang District,
Taizhou, Zhejiang Province, China

# User Manual

## i-walk Electric kick scooter

i·walk®

KS1 Electric scooter

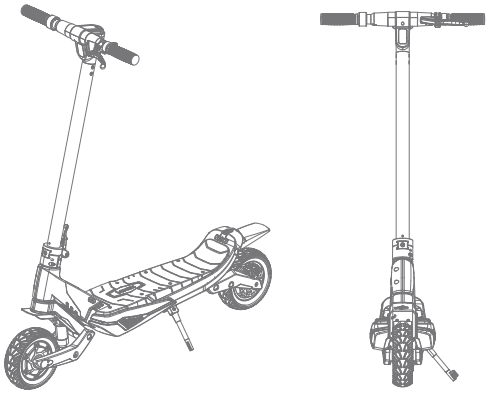


Dear customer

Thank you for choosing i-walk two wheel e-scooter(hereinafter called KS1).Please read the manual carefully before operating your KS1. It contains important safety precautions and correct instructions for use.

Obtained from the manual:

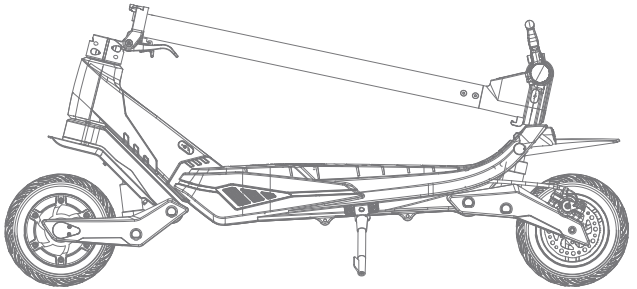
1) Learn the basic driving method of KS1.
2) Follow driving principles and skills to ensure a safe and enjoyable driving experience.
3) Know the structure, operation and maintenance methods of KS1.



CONTENTS

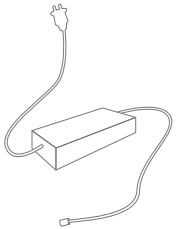


## 1.PRODUCT & ACCESSORIES



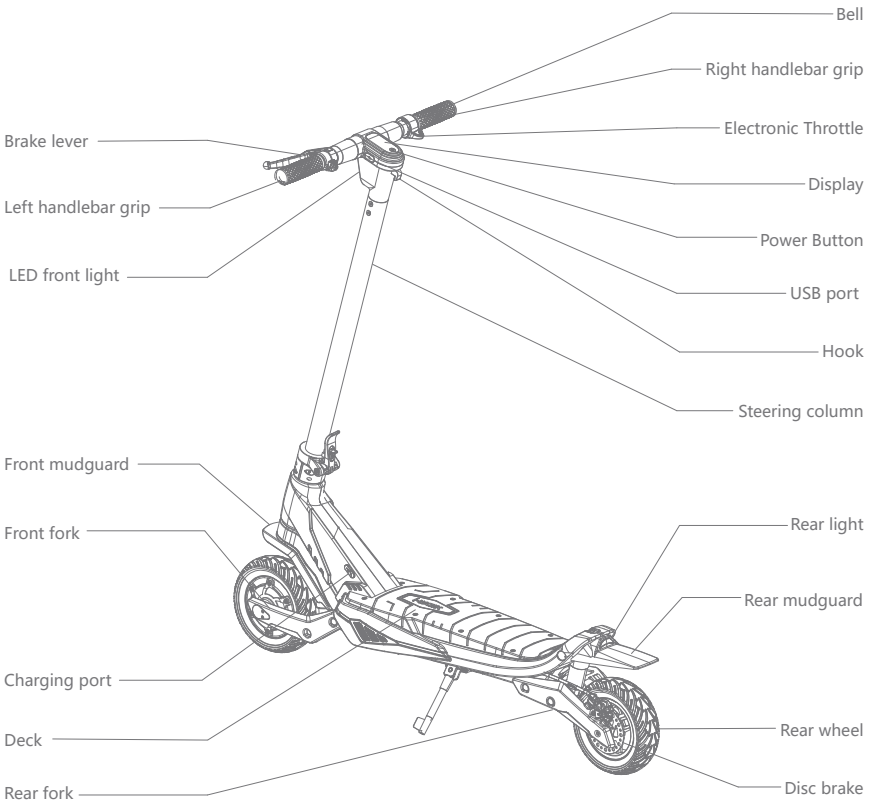
KS1 scooter


Manual

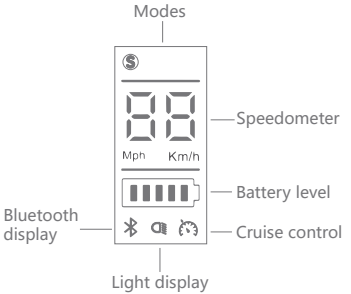


Charger

## 2.COMPONENTS




## 3.DISPLAY & SWITCH




Modes: Three modes available
"ECO" for energy saving mode
"D" for standard mode
"S" for sport mode

Speedometer: Show current speed.

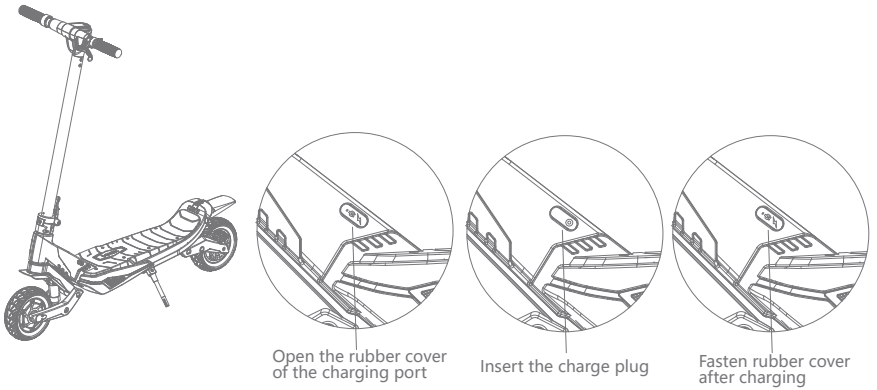
Battery level:Show the battery's remaining power by five bars. Each represents around 20% of the full battery capacity.

Bluetooth display:The icon indicates the scooter has been connected with the mobile device.

Light display: The icon indicates the head light is on

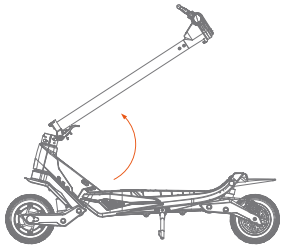
Cruise control: The icon indicates the scooter is in cruise control status.

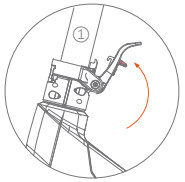
## 4.CHARGING



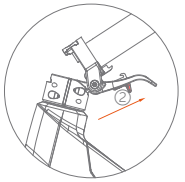
# 5.INSTALLATION

1.Unfold KS1

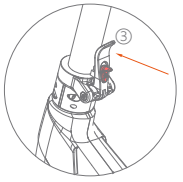





Pull up the steering column①



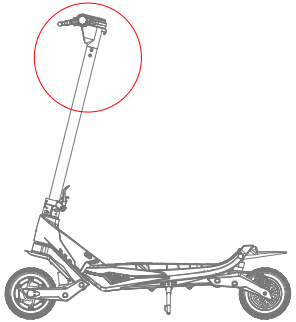

Push up the red button②




Press the folding buckle③

2.Stem head assembly

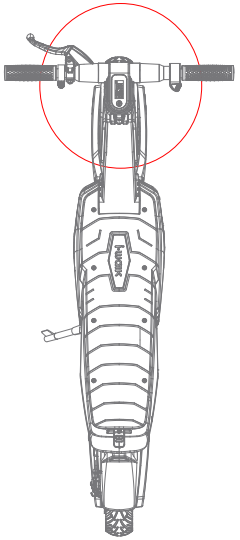
Take out the screw and wrench



Assemble the stem head as the picture and tighten the screws



3.Check whether the switch is working

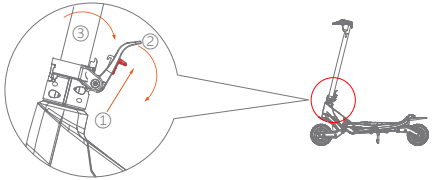


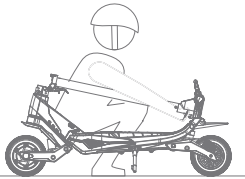
4.Check out the brake to ensure it is effective



## 6.FOLDING AND HANDLING

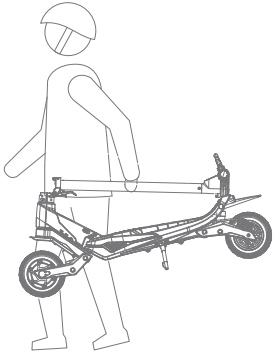
1)Make sure that the e-scooter is turned off. Hold onto the steering column and open the folding buckle



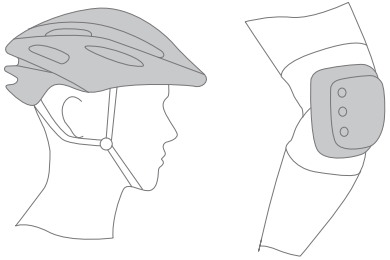
Push up the red button ①, open the folding buckle ②, fold the steering column ③

2)Hold the middle part of steering column when handling, and keep balance

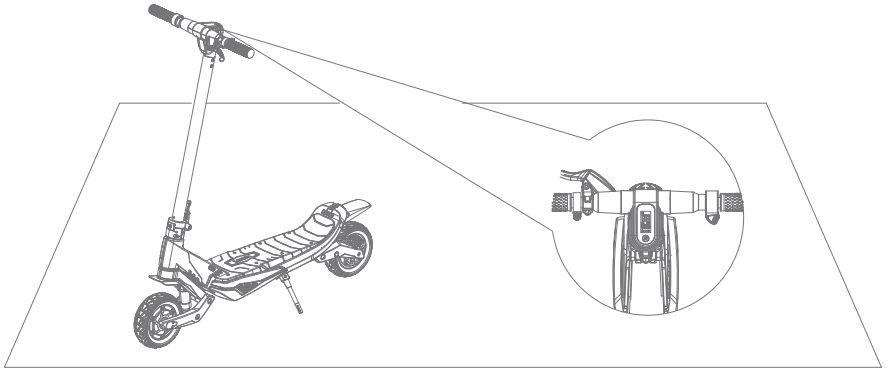


# 7.LEARNING TO RIDE

Attention: Wear a suitable helmet and other protective gear on every journey!

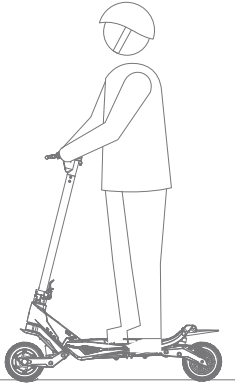


Attention: First learning, check the battery indicator light and practice in the open field (≥4m*4m).



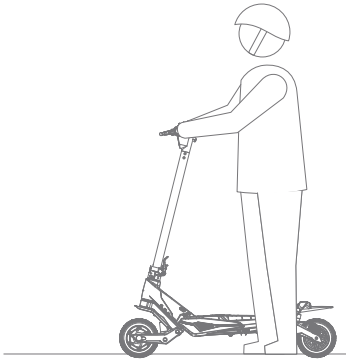
Hold onto the handlebars and slide backward with one foot

Place one foot on the back deck to keep balance and gently speed up by speed regulator.

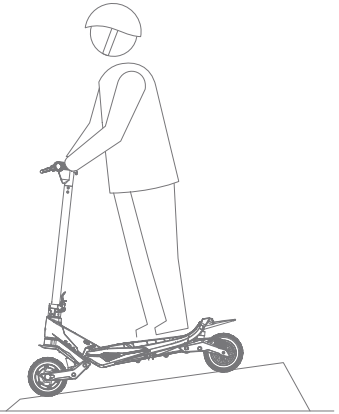


Use the brakes to slow down after steady driving

## 8.TO AVOID ACCIDENTS

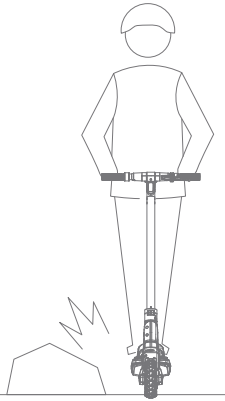


⚠ Turn off the power to prevent sudden acceleration



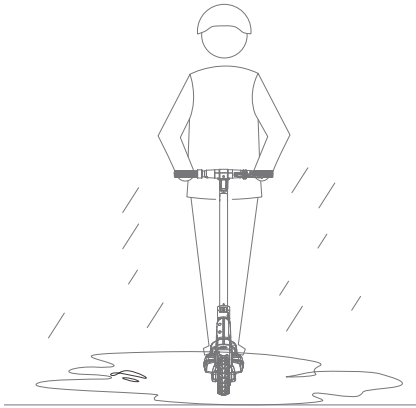
⚠ Do not accelerate or stop abruptly at downhill

⚠ Please slow down or get off when the road condition is bad

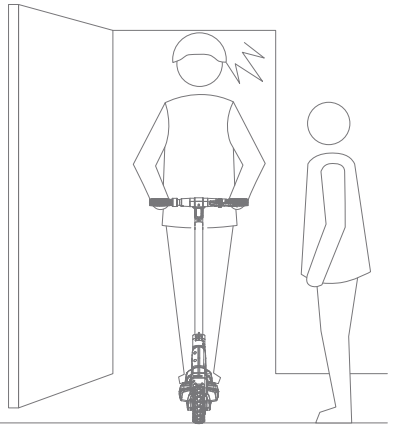


⚠ Please avoid the obstacles

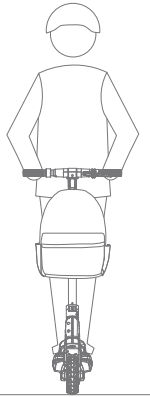




⚠ Prohibited to ride in the rain or on the road with more than 2cm water



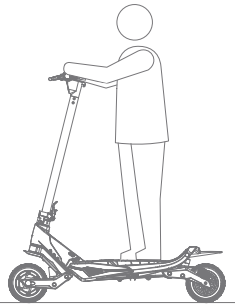
⚠ Avoid hitting door frames, elevators and other tall obstacles



⚠ Do not hang heavy objects such as backpacks on the handlebar

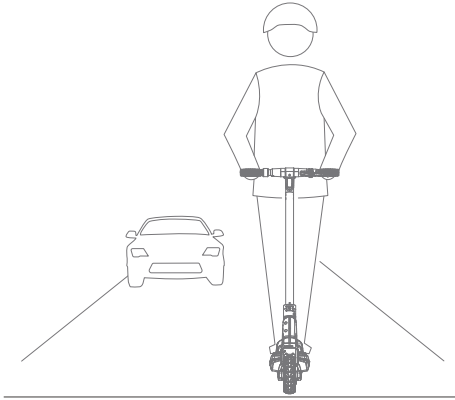

⚠ Do not ride in temperatures below -5℃

## 9.DO NOT TRY FOR DANGEROUS ACTIONS



No riding for minors under 12 years old

Do not ride the scooter without placing both hands on the handles

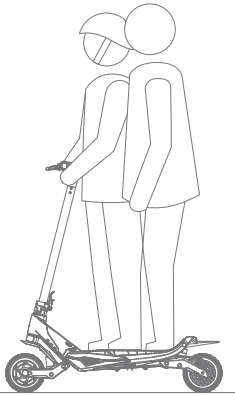


Do not ride in motor vehicle lane or residential district mixed with cars

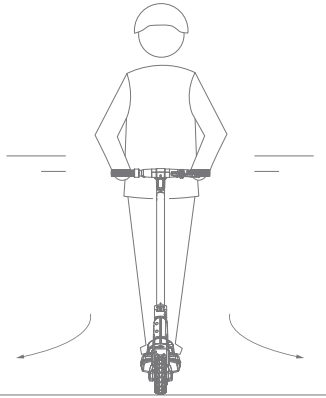
Do not put single foot on the deck or on the ground when riding



Do not ride up and down stairs or jump over obstacles



Do not carry any passengers



Do not turn the handle substantially when riding

Do not carry a child

## 10.SAFTY INSTRUCTIONS

1)Safety Statement

KS1 is a  light motorized vehicles for prersonal transportation . Once you ride into a public area, it will also have vehicle properties and pose a safety risk .Riding in strict accordance with the instructions in this manual and in compliance with the national and regional traffic regulations will best protect you and others.

At the same time, you also need to understand: once the KS1 riding on public roads or other public places, even if you fully follow this safe driving guide, may also face the risk caused by illegal driving or improper operation of others or vehicles. Therefore, it is very important to keep the proper speed and safe distance from others. Stay alert and slow down when entering unfamiliar terrain.

Please respect the rights of pedestrians while riding and avoid frightening them, especially children. Go after the pedestrian, promptly reminded pedestrians and slow down by. Take the left as far as possible. (for vehicles on the right country and region). When facing a pedestrian, keep to the right and slow down.

The safety requirements of this manual must be strictly observed when driving in countries and regions where there are no clear legal provisions. For violation of this manual to all property, personal loss, accident, legal disputes,etc., and all other adverse events caused by conflicts of interest, the company will not undertake any direct responsibility and joint and several liability.

Do not lend the KS1 to a person who can not operate. If the electric scooter was used by others, please be sure to be responsible for their safety,and make sure they wear protective gear, teach them to ride.

Please check the KS1 before each riding, if found loose parts, battery life is decreased obviously, tire slow leak, excessive wear, some parts such as a sound or failure abnormal situation, please stop using immediately. You can dial the company's service phone or visit the website for professional guidance or maintenance services.



2)Precautions

①Safety protective equipment such as helmet, gloves, elbow and knee protector must be worn before riding, to prevent accidents and falls;

②Scooter inspection: Before riding you need to check whether the power is sufficient, the scooter is abnormal or loose;

③Prohibit riding on wet roads, especially snow and water pavement;

④It is recommended not to ride on the upper and lower ramps above 15°;

⑤Prohibit riding in the rain;

⑥Minors under 12 years old are not recommended to study and ride;

⑦Try to avoid rapid acceleration and rapid deceleration, not excessive forward and backward body, is strictly prohibited speeding;

⑧When the remaining power is low, please keep low speed and charge as soon as possible;

⑨If you are at risk of falling, please focus on personal safety;

⑩Do not put your hand in your pocket while riding, otherwise you may be due to loss of balance or fall and suffered serious injury;

⑪Do not put KS1 in the car trunk in high temperature weather for a long time;

⑫Take the initiative to understand and comply with local traffic laws before riding KS1 ;

⑬Pay attention on the surrounding people and things, to avoid a collision;

⑭When other people ride electric scooters together, please keep a safe distance and do not ride side by side;

⑮Do not ride in bad light, if necessary, please reduce the speed, keep vigilant;

⑯Do not go backwards;

⑰Do not let others use your electric scooter unless he/she has read the manual carefully and has learnt to ride;

⑱Do not ride in unhealthy or the presence of alcohol or drugs;

⑲Do not lift your electric scooter from the tire to avoid injury between the tire and the case.

## 11.MAINTENANCE

1)Cleaning and storage

Please clean KS1 in time after use to maintain the best performance. Wipe the KS1 with a damp cloth, use a nozzle to wash the tires and fenders (water pressure< 1Mpa, or 145PSI). Dry in a ventilated place to avoid corrosion. Stains or scratches on plastic surfaces that are difficult to clean can be brushed with toothpaste.

Noted:
①When cleaning, please ensure that the KS1 is shut down and the charging port cover is closed, in case of electric shock or serious failure.
②Do not use the high-pressure water gun to directly flush or soak in water, in case of a serious failure that cannot be repaired.
③Do not use alcohol, gasoline or other corrosive or volatile chemical solvents. These substances will damage electric scooters beyond repair.

2)Battery pack maintenance

The battery pack is the most important part of the KS1. To extend your battery life as much as possible, follow the instructions below:

●Carefully read the precautions on the battery pack surface label and follow the instructions;

●Please try to keep the battery pack at 0 ℃ ~ 40 ℃ room temperature drying environment, high temperature and low temperature environment will affect the battery life. Please avoid below -20 ° C or higher than 50 °C in the use of the environment of the battery;

●When used at room temperature, the battery can bring out higher range and performance. Which will be degraded when used at temperatures below 0 ℃ .

●Please try to store the battery pack in a dry, cool environment. In a closed wet environment, the battery pack may will get water, but also can cause the battery pack to be damaged quickly. If the environment can not be avoided wet, please use a large self-styled bag sealed the battery pack;

●In daily use, try to avoid completely running out of the batteries. Please charge as soon as possible when the dashboard indicates that only 10% ~ 20% is left. Battery capacity and life will be seriously affected if the battery is in a state of exhaustion for a long time.



Noted:
A fully charged KS1 will drain its storage capacity after 90-100 days of standby, and a nearly depleted battery will drain after about 10-20 days of standby. If not charged in time, it is likely to lead to excessive discharge of the battery and damage. This damage is not recoverable and is not guaranteed.
Non-professionals are prohibited from removing the battery pack, otherwise it may cause a serious safety accident due to electric shock or short circuit!.

## 12.Harmful substances

| PARTS | Harmful substances | | | | | |
|---|---|---|---|---|---|---|
| | Pb | Hg | Cd | Cr(Vl) | PB | PBDE |
| Charger | ○ | ○ | ○ | ○ | ○ | ○ |
| Battery | ○ | ○ | ○ | ○ | ○ | ○ |
| Charging port | ○ | ○ | ○ | ○ | ○ | ○ |
| Light | ○ | ○ | ○ | ○ | ○ | ○ |
| Circuit board | ○ | ○ | ○ | ○ | ○ | ○ |
| Motor | × | ○ | ○ | ○ | ○ | ○ |
| Shell | ○ | ○ | ○ | ○ | ○ | ○ |

This form is compiled according to the regulations of SJ/T 11364
○: the content of the substance is lower than the limit specified in GB/T 26572
X: the content of the substance is higher than the limit specified in GB/T 26572

## 13.SPECIFICATIONS

| Project | Parameter | Description |
|---|---|---|
| Size | scooter size L×W×H (mm) | 1128*530*1206mm |
| Weight | Weight Capacity (kg) | 100kg |
| | Net Weight (kg) | 19.2kg |
| Electric Scooter | Max Speed (km/h) | 25km/h |
| | Range (km) | 10.4Ah: 40km |
| | | 15.6Ah: 60km |
| | Max Slope (°) | 10° |
| | Road | Asphalt/flat roads, ramps less<10°, etc. |
| | Working temperature(℃) | -10 ℃ ~ 40℃ |
| | Storage temperature(℃) | -20℃ ~ 45℃ |
| | Charge Time | Around 5 hours |
| | Certification | CCC,CE,FCC,PSE,UL,SAA |
| Battery pack | Waterproof level | IP54 |
| | Nominal Voltage (V) | 36V |
| | Max charging Voltage (V) | 42V |
| | Rated Capacity (Wh) | 374 / 562 |
| | BMS | Overcharge protection, overheat protection, overdischarge protection, short circuit protection,overcurrent protection etc |
| Motor | Rated Power(W) | 350W 350*2W |
| | Max Power(W) | 500W 500*2W |
| Charger | Certification | CCC, CE, RoHS |
| | Rated Power | 84W |
| | Rated input voltage(V) | 100 ~240VAC/50~60Hz |
| | Rated output voltage(V) | 42V |
| | Rated current (A) | 2A |



## 14.THE COMMON FAILURES &TREATMENT MENTHODS

| Common failures | Cause of failure | The solution |
|---|---|---|
| No power output after startup | There is no power supply | 1.Check whether the battery is installed |
| | | 2.Battery voltage is insufficient,charge the battery |
| The riding range decreases | 1.Insufficient battery charge | 1.Check whether the battery is damaged or not |
| | 2.Tires are badly worn | 2.Contact after sales for tyre replacement |
| | 3.Frequent braking, starting and overload | 3.Develop good driving habits |
| | 4.Battery aging or normal attenuation | 4.Replace the battery |
| | 5.Low environmental temperature and attenuation of battery capacity | 5.Ride in a room temperature environment |
| The battery can't charge | 1.The charger is not plugged in | 1.Check whether the plug is loose |
| | 2.The battery temperature is too low | 2.Wait for the battery to recharge the right temperature |
| | 3.The battery is too hot | |
| Instrument no display | 1.There is no power supply | 1.Check whether the battery is connected; |
| | 2.The power converter is damaged | 2.Charge the battery under negative pressure |
| | 3.The dashboard malfunction | 3. Contact the after-sales service to replace the damaged parts |
| Power supply and motor cannot start | 1.Braking | 1.Check whether the brake is on brake |
| | 2.The dashboard key failure | 2.Contact after sales,check the dashboard |

## 15.WARRANTY POLICY

1)Warranty period

①Since the date of your receipt within 7 days. In case of non-human performance damage, users can choose to return, replace or repair the KS1 electric scooter.Return shall be handled with valid purchase vouchers;
②Since the date of your receipt within 8-15 days. In case of non-human performance damage, users can choose to replace or repair the KS1 electric scooter ;
③The warranty period shall be on the date of receipt of the customer's signature, if the date of receipt cannot be checked, the warranty shall be made according to the order number of the official website and the purchase invoice.
④The warranty policies of the main engine and each part are shown in the following table

2)Warranty content

| Types | Part Name | Warranty Time |
|---|---|---|
| Scooter | Frame assembly, motor, controller assembly, handlebar, front frame, cabin Dashboard, rear hub, folding stand, fork, fork front tube rotating parts, control System，brake wire | 1 year |
| Attachment | Battery, Charger,Electronic Throttle,Brake lever | 6 months |
| wearing parts | Anti-collision strip, headlight assembly, display cover,handle sets, tires, mud board, decorative cover, foot support components, foot pad,charging port, plastic plug | 3 months |

3)Non - warranty policy

①Over the warraty period for National Three Guarantees Policy;
②Damage caused by force majeure, such as flood, earthquake, typhoon, debris flow and othernatural disasters;
③Any damage caused by use, maintenance and adjustment not required by the instructions;
④Failure or damage caused by forced use of KS1 beyond normal operating conditions, such as overload, riding over obstacles, extreme sports, etc;
⑤Disassembly or repair without authorization of IWALK;



⑥Malicious damage warranty card content, scooter body information, including smear damage, tear, tamper, etc
⑦Other faults and damages not caused by design, manufacture, quality, etc
⑧If the KS1 is used for commercial purposes, it is not guaranteed.

## 16.AFTER-SALES SERVICES

In the process of using i-walk electric scooter, if you have any consultation on driving, maintenance, safety and other issues, you can consult or repair through various after-sales service channels provided by the official website of IWALK company.

IWALK official website: http ://www.zjiwalk.com
IWALK reserves the right to amend this Manual or any of the rules from time to time as required. If there are any changes to this Manual, IWALK will notify the user on its website without prior consent of the user.The revised specification and rules shall become a part of this specification as soon as the formula becomes effective.

# 17.MAINTENANCE RECORD

The user name: _____ Contact number: _____

| Maintenance date | Failure reason | Fault handling condition | Repairman |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

Note: this card is an important guarantee for product warranty. Please keep it properly. Do not alter, miss or destroy.

Chassis number(SN) Labeling place

Seal of the maintenance department

# Specification

| Model | | | KS1 | Remark |
|---|---|---|---|---|
| Image | | |  | Rendering |
| Main Parameter | Parameter | | Description | Remark |
| | Max Speed | | 25km/h | Max speed can be adjusted by firmware |
| | Typical Range | | ≥35km | 25 ℃ /without wind /75 kg weight/ asphalt road/ 18 km/h speed measured |
| | Battery Size | | 36V 374Wh lithium battery | The specific battery parameters are shown in electric control part. 40 pcs cells |
| | Max Slope | | 12% | |
| | | | Asphalt/flat pavement,brick road, stone road; obstacles<1 cm; gaps <3cm | Description of cycling road surface. A description of the ability to walk through obstacles and steps. |
| | Net Weight | | 19.2KG | |
| | Brake | | Front EABS brake and Rear dics brake | |
| | Braking Distance | | 25km/h speed<br>1:single brake: braking distance≤10m<br>2:double brake: braking distance≤4.4m | Braking distance in accordance with eKFV standard |
| | Duration of Charging | | 5 hours | Charger 2A |
| | Temperature range of charging | | available temperature (0~40℃)<br>suggested temperature (10~35℃) | It can maximize the battery life when charging at suggested temperature |
| | Nominal load | | ≤120kg | |
| | Waterproofing Grade | | IPX54 | |
| | Lighting | | 1.1W light | |
| | Tail light | | LED tail light | |
| | Bell | | available | |
| | Working temperature | | (-10~40)℃ | |
| | Storage temperature | | available temperature ( - 20~50℃)<br>suggested temperature (5~30°C) | Storage at extreme temperature will not cause immediate damage, but may significantly reduce product life and battery life.<br>storage at recommended temperature can maximize battery and body life |
| | Max storage time<br>(30%electric quantity) | | State as delivered (30% battery level) ~100days<br>Depletion mode<60days | Storage time until the battery self-discharging reaches the protection/damage threshold |
| | scooter size L×W×H | | 1128*530*1206 | |
| | Center distance between two axes | | L925mm | |
| | Ground clearance | | 110mm | |
| | Suspension distance | | 30-35mm effective distance | |
| | Footboard size L×W | | 522*182mm | |
| Packaging | **Packaging Content** | | **Description** | **Remark** |
| | Packing size L×W×H | | 1160*310*560mm for one case | 1 units per case |
| | Folding size | | 1128*530*510mm | |
| | Packaging Material | | cartoon | |
| | Scheme 1 | Number of Scooters for one 40HQ | 330 units/40 HQ | |
| **Integrity design** | | | | |
| Mechanical Control | **Structure** | | **Description** | **Remark** |
| | Grip material | | PVC | |
| | Front wheel | Front wheel drive mode | Driven wheel, Wheel hub motor | |
| | | Front wheel size | 8 inch (OD 200mm) | |
| | | Tire | Solid tire | |
| | | Running distance | 10000km | |
| | | Shock absorption mode | Front suspension | |
| | | Front wheel brake | EABS brake | |
| | Rear wheel | Rear wheel drive mode | Drive wheel | |
| | | Rear wheel size | 8 inch (OD 200mm) | |
| | | Tire | Solid tire | |
| | | Running distance | 10000km | |
| | | Rear wheel brake | Rear disc brake | |
| | Body part | Material | magnesium alloy | |
| | | Parking | Kickstand | |
| | | Steering turning angle | 60 degrees each side | |
| | | Footpad | engineering plastic | |
| Electronic control | **Software function** | | **Description** | **Remark** |
| | Display information | Battery level | Digital tube indicator( 5 digital tubes) | 5 digital tubes on (100-80%)<br>4 digital tubes on (80-60%)<br>3 digital tubes on (60-40%)<br>2 digital tubes on (40-20%)<br>1 digital tube flashing( < 20%) |
| | | Speed | digital display/ mph & km/h can be switched | switched by firmware |
| | | Power deficiency | The last grid of digital tube power flash | |
| | | During charging | Digital tube power indicator flashing | |
| | | Charging finished | The digital tube is filled | |
| | | Report errors | display error codes | |
| | Battery pack | Nominal Voltage | 48V | |
| | | Max charging Voltage | 54.6V | |
| | | Rated Capacity | 10400mAh/499Wh | 52 pcs cells |
| | | Cell | 2600mAh | |
| | | Rated Output | 350W | |
| | | Peak Output | 374W | |
| | | Cycle life | above 80% capacity remaining after 500 charging cycles | 0.2C charging, 0.5C discharging |
| | | Temperature range of Charging | 0~45℃ | |
| | | Temperature range of Discharging | - 20~60℃ | |

| | | | | |
|---|---|---|---|---|
| | | BMS | Overcharge protection, overheat protection, overdischarge protection, short circuit protection,overcurrent protection etc | |
| | Motor | Type | Hall brushless dc motor | |
| | | Rated Power | 350W | |
| | | Max Power | 450W | |
| | | Outlet mode | right side | |
| | | Max Torque | 14N.M、2x14N.M | |
| | | Drive control plan | FOC Drive | |
| | System control | Startup & shutdown scheme | Bluetooth APP | encryption bluetooth communication |
| | | Riding mode switch | Bluetooth APP | Hidden bluetooth |
| | | Front light switch | Bluetooth APP | |
| | | Glide start | The throttle works only if the speed is 3 km/h and above | |
| | | Speed up | L-hall | |
| | | brake | L-hall | |
| **Parts** | Charger | External charger | 42V 2A | |
| | IoT | Mounted on steering column | Optional | |
| | | Build-in stem | Optional | |